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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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British Laboratory Glassware

SOME account is given in this issue of the remarkable progress that has been made in this country in the home production of laboratory glassware, apparatus, and furnishings. As in dyestuffs and fine chemicals, the old theory that one had to seek abroad for the necessary materials with which the research chemist conducts his delicate operations has already gone. Already his needs can nearly all be supplied from the products of British works, and in point of quality these not only equal, but in some cases surpass, the best to be obtained from other countries. The development of modern laboratory glassware in this country during the past decade is reviewed on another page with knowledge and critical insight by Professor Turner, the head of the Department of Glass Technology in Sheffield University, who himself has appreciably contributed to the progress made by his scientific work and by his loyal stand for British manufacturing houses. The contrast he draws between the poor position in which we stood when war broke out with the entirely changed situation of to-day brings out effectively the advance made in the interval, and something that is especially satisfactory in the present attitude both of manufacturers and of research workers. Instead of being lulled into a false sense of security by what has been achieved, they recognise that to keep and develop what has been gained, continued research must be prosecuted. If this is done, there will be in the field of laboratory glassware and furnishings, as in others, a complete reversal of the old fashion of decrying British products and extolling those of other nations.

There may, indeed, have been some reason for this attitude in the past. There is very much less to-day, and in due course, if the present efforts are maintained, there will be none at all. The good work that has been done on the scientific and manufacturing side needs, however, the support of the British user. Occasionally one hears complaints that this support is not as cordial or as general as those who have spent so much effort and money in the production of satisfactory British goods have a right to expect. This, we believe, is largely a matter of habit, which can be changed, though the process is often a little slow, by education and the pressure of sound opinion. It has been a pleasure recently to publish some convincing commercial and scientific testimonies to the excellent quality of British wares. To these may now be added the weighty evidence of the National Physical Laboratory in its new report for 1925. The Laboratory itself has now in use several kinds of British chemical glassware which are proving very satisfactory, the resistance towards chemical reagents being again confirmed by recent tests. In this connection it may be added that the examination of a type of glassware of foreign origin, representing a variety very widely employed at one time, showed that while the standard was fully maintained it did not equal that of the best modern resistance glass. Generally it may be said that there is little but satisfaction to be derived from an investigation of the position this country occupies to-day from the point of view of laboratory requirements.

Technique of Beet Sugar Production

IN the discussion at the chemical engineers conference last week on Mr. Kwantes' paper on "Beet Sugar Manufacture" some of the economic and technical problems with which the industry is faced were enlarged upon. The Cantley factory was described as one of the most modern and scientific of its kind in this country. There are now 128,000 acres under cultivation for beet, and shortly, it is expected, 1,000,000 tons of beet will be converted annually into sugar. Some apprehension naturally exists as to the fate of the industry when the subsidy expires. To-day there is a bounty of £19 10s. per ton, which ultimately falls to £6 per ton, and ceases after 13 years. When it is

recalled that the bounty at present covers the cost of the raw material, it will be appreciated how important is the assistance afforded by the Government. Existing prices for beet range from 54s. per ton—delivered to the factory, for 15½ per cent. sugar beet, with 2s. 6d. per unit variation up or down for any rise or fall in the standard—to 49s. per ton. The sampling of the beet occasionally leads to complaints from growers, despite the fact that their representatives are almost invariably present. The trouble is chiefly due to the determination of the tare, and it only needs a little reflection to realise that accurate sampling calls for the exercise of care, intelligence, and impartiality.

Not a few of our leading chemists hold that some fundamental research is necessary in connection with the extraction of sugar juice from beet. Dr. Ormandy referred to the work of a late Italian count, who had conducted important investigations relating to the electrolytic separation of the sugar juice. A cell having anodic and cathodic connections and provided with a diaphragm was used for this purpose. The sugar molecule was caused to pass through the cell walls. Operating in this way, a concentrated juice of 90 per cent. sugar content could be obtained, with a high degree of purity. Here is a tentative method which might with advantage be followed up. The expenditure on fuel constitutes an important item, and must be reduced if the industry is to continue after the subsidy ceases. The electrolytic method is calculated to economise fuel in an important degree, as it gives a concentrated juice. Moreover, purification expenses are likely to be reduced appreciably. It was suggested that if control were exercised *via* P_H determinations, as regards the lime-treatment process, a saving of lime and steam would doubtless result. Similarly, instead of using excess lime in order to aid filtration of the treated juices, filter accelerators might with advantage and economy be employed.

It was elicited that activated carbon is largely used for decolorising the beet sugar juices, and the Norit process appears to be one which is largely favoured. This seems to be a more economical method than redissolving the crude sugar and re-crystallising. In considering the relative merits of the Steffen process, which is of Austrian origin, and the De Vecchis process, experts suggested that the latter offered some undoubted advantages, but those who were operating the Steffen process pointed out that the De Vecchis process necessitates the erection of plants for the treatment of the beet at various points where factories do not exist, and the fact that it is impossible to employ advantageously the fuel used militates against its extensive adoption. The De Vecchis process involves the drying of the beet to a water content not exceeding 3 per cent. It appears, however, that the recovery of sugar from dried beet is not nearly so efficient as from the fresh slices. Moreover, the dried beet deteriorates in quality on keeping; it "heats up," and generally there is difficulty in preservation.

Finally, Sir Frederic Nathan touched upon the question of industrial alcohol in relation to molasses from beet sugar manufacture. A conservative estimate suggests that 3 per cent. of molasses is produced. Seventy gallons of 95 per cent. alcohol can be obtained from one ton of molasses. As 1,000,000 tons of beet will be grown annually, it would appear that here is a potential source of 2,000,000 gallons of industrial alcohol per year. Whether or not this quantity is likely to accrue depends upon a number of factors with which it is impossible to deal here.

Powdered Hydrocyanic Acid

A PAPER recently presented before the New York Section of the American Chemical Society by Mr. F. J. Metzgar, of the Air Reduction Company, contained some interesting particulars of a product which may be regarded as something of a novelty among cyanides, and for which there should be many possibilities in commercial use. As is well known, hydrocyanic acid is employed in fairly considerable quantities as a fumigant and pesticide, but in the gaseous or liquid state it presents many disadvantages in the way of handling, transport, and application. The new substance, which the California Cyanide Company have succeeded in producing, is in the much more convenient form of a powder, and consists of calcium cyanide which on exposure to air yields hydrocyanic acid freely and more or less quantitatively. The raw materials used in the manufacture of the new product are commercial calcium carbide and liquid hydrocyanic acid, the latter containing a small proportion of water as a catalyst.

Mr. Metzgar points out that hydrocyanic acid with a slight water content readily reacts with calcium carbide, liberating acetylene and yielding calcium cyanide, the reaction proceeding rapidly and smoothly to completion and being similar in this respect to the action of water on carbide. The means for producing the hydrocyanic acid is, of course, a consideration of importance, and in this particular case the HCN is derived from the well-known nitrogen fixation process, involving the treatment with nitrogen of a mixture of alkali metal compounds and carbon whereby sodium cyanide results. The last named is then treated with carbon dioxide, and this results in the liberation of hydrocyanic acid. The finished product contains only such impurities as are common to calcium carbide while it is in an extremely fine state of subdivision, and is, therefore, admirably adapted for dusting purposes. The cyanogen content varies to a slight extent in accordance with the quality of the carbide employed. It usually ranges, however, between 52 and 58 per cent. From the point of view of the user, it is interesting to note that the moisture in the air is sufficient to liberate hydrocyanic acid very rapidly, so much so that when spread in extremely thin layers about 75 per cent. of the HCN content is evolved in some 30 seconds and practically all of it within one minute.

From the properties attributed to it there would seem to be little doubt that this new form of calcium cyanide is particularly suitable for such operations as have hitherto been accomplished by means of liquid or gaseous hydrocyanic acid. Its extremely fine state of subdivision makes distribution of the gas a simple operation. The powder is perfectly stable under all ordinary conditions of storage and transportation, provided only that it be protected from atmospheric contact. On the contrary, liquid hydrocyanic acid is dangerous to handle, and it is difficult and dangerous to transport, since it is subject to spontaneous poly-

merisation which may result in violent explosions. No doubt, many new applications of the new product will be found. On account of its ready solubility in water and a number of organic solvents, numerous applications of " powdered hydrocyanic acid " suggest themselves.

Science's Debt to the N.P.L.

THE report for the year 1925 of the National Physical Laboratory is, like its predecessors, a volume that no serious student of progress in research can afford to miss. It is a mine of information on a large variety of scientific subjects, both pure and applied. The spirit in which it is written shows how much the Civil Service has gained by the entry of the science man, for what emerges most clearly from a perusal of the report is that those responsible for the work of the Laboratory realise that they are before everything else public servants, and lose no opportunity of rendering assistance to all who ask for it. No task seems too large for them; none too small. The report even contains a reference to measurements of the rate of penetration of heat or cold into large masses of apples!

The main chemical interest of the report lies in the section dealing with the Department of Metallurgy and Metallurgical Chemistry, with which we hope to deal more in detail in our Monthly Metallurgical Supplement next week. Some points in it, however, and other incidental references to chemical matters deserve a word now. Further advances, it is satisfactory to hear, have been made in the preparation of pure beryllium, while its alloys with aluminium have been examined. A number of interesting analytical investigations are described, and it may be noted that the quartz spectrograph is being used with success to detect impurities in metals. A method has been worked out for the production of silicon of 99·7 per cent. purity. On the recommendation of a sub-committee appointed by the Fabrics Co-ordinating Research Committee to deal with tests on the fading of dyes, a survey is being prepared of existing knowledge on the relations between the spectra and intensities of sunlight and of artificial light sources proposed or suitable as substitutes. The notes under the heading " Aeronautical Chemistry " include references to the development of the technique of the preparation of cuprammonium solutions and the measurement of the viscosity of solutions of cotton therein, and to the exposure of certain varnishes to ultra-violet light. Work for the Glass Research Association having ceased on the dissolution of the Association, research on glass has been restricted to a continuation of the measurement of viscosities at high temperatures, which has been carried on with a view to throwing further light on the fundamental constitution of glass.

Any feeling of regret that chemistry, as such, does not come directly within the purview of the N.P.L. will now be removed by the establishment in close proximity to it of the National Chemical Research Laboratory, with Dr. G. T. Morgan as director. Work has already been started on several important problems, and the Chemical Director's reports, which will appear in due course, may confidently be expected to maintain the high standard set by his colleagues in the closely allied field of physics.

The New President

THE nomination of Mr. Francis H. Carr, of The British Drug Houses, Ltd., to the presidency of the Society of Chemical Industry for the ensuing year will be cordially endorsed throughout the profession and the industry. Mr. Carr, who has long been known as a very capable chemist, has of late been honourably associated with the effort to develop a fine chemical industry in this country. But his work as a chemist, conscientious and accurate as that has been, has not been confined to the laboratory; he has exhibited, as in the notable case of insulin, a very practical capacity for mastering the engineering and other technical difficulties of large-scale production, and has thus been able to convert to commercial and public use the theoretical fruits of research. To such bodies as the Chemical Society (of which his younger brother is assistant secretary), the Society of Chemical Industry, the Institute of Chemistry, the Association of British Chemical Manufacturers, and others, Mr. Carr has given loyal and unselfish service, and it would be a rare case indeed in which the welfare of chemistry or of chemists did not appeal to his sympathy. The restriction he would himself impose on any public reference to himself may for once be set aside to the extent, at least, of saying that the Society has selected for its president, in the slightly varied phrase of the messroom, a scientist and a gentleman. That, fortunately, is in complete accord with the traditions of the chair.

Books Received

THE DEVELOPMENT OF STAYBRITE STEEL. Sheffield: Thomas Firth and Sons, Ltd. Pp. 96. 12s. 6d.

REPORT ON THE INDUSTRIAL AND ECONOMIC SITUATION IN CHILE, September, 1925. By W. F. Vaughan Scott. London: H.M. Stationery Office. Pp. 94. 2s. 6d.

The Calendar

Apr. 27	Institute of Metals (North East Coast Section): Annual General Meeting. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne
28	Institute of Chemistry (Belfast Section): Visit to the Belfast Municipal Gas Works	Belfast
28	Royal Microscopical Society—Industrial Applications Section: "Some Microstructural Features of Modern Rustless Steels." J. H. G. Monypenny. 7 p.m.	20, Hanover Square, London, W.1
29	Royal Institution: " The Imperfect Crystallisation of Common Things." Sir William Bragg. 5.15 p.m.	21, Albemarle Street, Piccadilly, London
29	British Science Guild: Annual Meeting: " Dyestuffs." Dr. E. F. Armstrong. 4.30 p.m.	Mansion House, London
May 5	Society of Public Analysts: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London
6	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, London
6, 7	Ceramic Society—Refractory Materials Section	Atlantic Hotel, Newquay
6 & 13	Royal Institution: " The Imperfect Crystallisation of Common Things." Sir William Bragg. 5.15 p.m.	21, Albemarle Street, Piccadilly, London
7	Chemical Engineering Group: Annual General Meeting, 6.30 p.m.	Florence Restaurant, 56, Rupert Street, London, W.1
13	Optical Society: Ordinary Meeting. 7.30 p.m.	Imperial College of Science and Technology, South Kensington

The Development of Modern Laboratory Glassware

By Professor W. E. S. Turner

The following article by Dr. Turner, Professor of Glass Technology in the University of Sheffield, offers convincing evidence of the progress made in the past ten years in the production of laboratory glassware in this country, and of the high quality of production attained. Scarcely less satisfactory is the assurance that the work that has made this progress possible is being steadily continued with a view to further improvements.

THE industry concerned with the production of laboratory glassware in Great Britain developed entirely as the result of the war. Although one of the objects of this article is to lay stress on this very considerable achievement, the story may well, from its special interest to the chemist, be set in a more general account of the subject.

To the chemists engaged during the first half of the nineteenth century in accurate quantitative work, such as the determination of atomic weights, the use of glass vessels was not infrequently attended with difficulties arising from the contamination of precipitates by matter extracted from the glass. Such, for example, was the experience both of Berzelius and of Dumas. Stas, who was confronted with the same source of trouble, spent much time in an investigation to discover a resistant glass which could be produced commercially, finally deciding on a soda-potash-lime-silica glass having the percentage composition SiO_2 77, CaO 10·3, K_2O 7·7, Na_2O 5·0. As a matter of fact, manufacturers of that day found Stas' glass hard to make and work, and the nearest approach to it for many years was the well-known glass of Kavalier, containing SiO_2 75·8 per cent., CaO 8·6, Na_2O 6·9 and K_2O 7·9.

In England much apparatus before 1870 was made of potash-lead-oxide glass, and the Whitefriars Glass Works supplied considerable quantities of glassware to scientific institutions up to about 60 years ago. Shortly after 1870, German soda glass was introduced in this country and Kavalier's glass also at about the same time. The latter is, for all-round purposes, superior to the potash-lead-oxide glass and was for some years the only resistance glass available. Jena laboratory glassware was brought out in 1892. It was the first borosilicate glass to be made for general chemical purposes, and its superior chemical and thermal resistance soon gained for it a wide reputation. Another early resistance glass was that of Greiner and Friedrich, known as resistance " R " glass.

Whilst the laboratory glassware industry practically passed out of existence in the last quarter of the nineteenth century and remained dead until 1915, America, although a considerable importer of foreign chemical ware, was much earlier in the field with glassware of home manufacture. As early as 1898 a glass, which was a copy of Kavalier's, was put on the market, and in 1903 Messrs. Whitall Tatum, of New Jersey, introduced the resistance glass known as Nonsol.

Effects of the War

When war broke out, our dependence for chemical glassware entirely on foreign sources was acutely felt. The seriousness of the situation was very soon realised by the chemists of the large Sheffield steel works, and they made representations on the subject to the Board of Trade and the Institute of Chemistry. For a time the situation was eased by the importation of foreign glassware, particularly the Reijmyre brand of a Swedish made borosilicate glass which we found later by test at Sheffield was not to be regarded as a first-class resistant glass. To meet the emergency a Committee of the Institute of Chemistry was set up in September, 1914, and several glass manufacturers intimated their willingness to help and their intention to go forward with the preparation of chemical glassware. Substantial progress was possible as the result of the mass of experimental work carried out by Professor (now Sir) Herbert Jackson, and also by Dr. T. R. Merton. This work made it possible in the early months of 1915 to issue formulas for resistant glasses to a number of glass manufacturers, and Sir Herbert Jackson's experience and assistance in connection with these and other glasses developed were constantly available for manufacturers during the period of the war when he served as adviser to the Optical Munitions and Glassware Supply Branch of the Ministry of Munitions. One or two other independent workers in 1914 gave very substantial assistance. For example, Dr. M. W. Travers was responsible for the development of the preparation and manufacture of the glass made by Duroglass, Ltd., and Mr. F. W. Branson also took an active interest in devising suitable formulas and getting into touch with manufacturers to try them.

Four firms ultimately settled down to the manufacture of flasks, beakers, and general chemical vessels of resistance glass in the early days of the war, namely, Messrs. Duroglass, Ltd., Walthamstow; T. J. Hands and Co., Ltd., Birmingham; John Moncrieff, Ltd., Perth; and Wood Bros. Glass Co., Ltd., Barnsley. All of them set out to produce resistance glass, and, although not without finding difficulties, quickly succeeded in putting on the market a variety of articles of satisfactory quality. The composition of the glasses produced by these firms was as follows :—

	SiO_2	B_2O_3	Al_2O_3	Fe_2O_3	ZnO	CaO	MgO	K_2O	Na_2O
Duroglass ..	66·51	4·57	6·74	0·08	3·62	4·35	0·33	2·58	11·52
Hands	65·45	7·13	6·18	0·09	9·06	0·40	—	0·34	11·81
Moncrieff ...	66·38	6·92	6·60	0·12	8·66	0·49	0·12	1·09	10·02
Wood	64·35	7·60	9·84	0·10	—	6·58	0·22	1·59	9·90

Glasses which are resistant to chemical reagents are also glasses that need a high temperature for their melting, and furnace problems were not absent from the many which the manufacturers had to face. Moreover, glasses of this type containing considerable quantities of alumina are more viscous than many commercial glasses, so that until the workmen had been thoroughly trained mechanical defects, such as the presence of cords, waves, etc., were not absent from some of the glassware produced in the early stages. Difficulties arose, also, in connection with the flanging of flasks and beakers, resulting in the cracking off of lips and rims. Mechanical defects, I am assured by dealers, occurred also in Jena glass when first introduced, and dealers have also mentioned to me that for a time after the war the new Jena 1920 glass was, for a similar reason, not altogether satisfactory. Considering the difficulties of the war situation, British manufacturers are really to be congratulated in surmounting fairly quickly these difficulties which almost invariably occur when a new type of glass is being developed.

The New British Chemical Glass

The chemical resistant qualities of the four different types of British chemical glass were exceedingly good. This was demonstrated by exhaustive tests carried out by individual workers, and particularly as the result of the investigations at Sheffield. The situation may be summarised by the statement from the paper of Mr. Cauwood and myself published in 1918 as the result of tests made on 21 types of glass (including five German and five American) employing no fewer than 13 individual tests in the case of 10 glasses and, for the other glasses, six of these 13 tests, namely, the action of boiling and evaporating water, water and steam under pressure at 183° C, 2N sodium hydroxide, N/10 sodium hydroxide, 2N sodium carbonate, and boiling and evaporating 24·2 per cent. hydrochloric acid. We stated* that " on reference to Table VIII it will be seen that six glasses . . . ., of which three are British, one American and two German, remain in the ' good ' class in every test." It may be mentioned that the fourth British glass was in the " good " class in five out of the six tests, whilst later its composition was modified to remove the one defect.

This record was exceptionally good, making the British glasses first-class glasses of all-round resistant character. It not infrequently happens that a glass is of excellent resistant character towards certain reagents but vulnerable to others, and because a glass does not offer great resistance to all types of reagent it by no means follows that it is not to be regarded as a first-class glass. The Jena glass of 1911, for example, had very good resistance to water but was not really satisfactory towards boiling concentrated HCl. On the other hand, a glass having a high total of acidic oxides, whilst furnishing excellent resistance to water and HCl, is naturally attacked

*J. Soc. Glass Tech., 1918, vol. ii, 2, 234.

more by strongly alkaline solutions. For example, Pyrex glass contains about 80 per cent. SiO_2 and 11-12 per cent. B_2O_3, making a total of about 92 per cent. of acidic oxides. As a glass, it is of the highest class in resisting the action of water and acids but loses in weight considerably more than either the four British glasses referred to or than the other American resistant glasses of the war period, when treated with caustic alkali solution. In recent years there has been a marked tendency to adopt the more acid type of glass by manufacturers in Great Britain, on the Continent, and in America; that is, to concentrate on furnishing the highest possible resistance to water, neutral salt solutions and acids, in view of the facts, first that in quantitative analysis strong caustic alkali solutions are seldom used, and, secondly, because glasses containing the acidic oxides, silica and boric oxide, have a comparatively low thermal expansion, and, therefore, better resist changes of temperature.

Pyrex glass, which is the best example of this particular type of highly acidic glass, was not developed as the outcome of the war. Dr. E. C. Sullivan, to whom, with his colleagues, particularly Dr. W. C. Taylor, the invention of Pyrex glass is due, informed me that his firm, The Corning Glass Co., had been interested in glasses of low thermal expansion for a number of years preceding the war and Pyrex glass was the ultimate outcome of a series of long-dated researches. The manufacture of this glass has been taken up under licence by other glass manufacturers, including one firm in this country and another in France. A number of resistance glasses in Germany and Czechoslovakia, one of which was boosted as an unbreakable glass, are to a large extent copies of Pyrex glass.

Post-War Developments

Since the war, the development of chemical resistance glassware has continued, although by no means all the manufacturers who supplied chemical glassware have continued to do so. This is particularly so in America where Pyrex glass has ousted practically all the other brands, and I understand only one other firm, Messrs. Kimble Bros., Vineland, N.J., continues to make any chemical glass besides the Corning Glass Co. In this country two firms, namely, Messrs. T. J. Hands and Co., and Messrs. Duroglass, gave up manufacturing, but two other glass firms of high standing, namely, Messrs. Chance Bros. and Co., Ltd., Birmingham, and James A. Jobling and Co., Ltd., Sunderland, have since the war taken it up. The last mentioned firm is responsible for the production in this country of Pyrex glass. The two other firms, namely, Messrs. John Moncrieff and Wood Bros., have continuously sought to develop further their own manufactures, and so it comes about that we have in this country at the present time a choice of no fewer than five different types of this class of ware (Messrs. Moncrieff now being responsible for two) with a fairly wide range of compositions ranging from the more basic to the very distinctly acidic type and all of them belonging to the highest class.

Ever since the founding of the Department of Glass Technology at Sheffield we have continued to watch closely the development of this branch of glassware and have tested a number of the foreign glasses developed since the war. As the writer pointed out a few weeks ago in a letter to *The Times*, we have come definitely to the conclusion that for range of compositions available, for resistance to the attack of chemical reagents and for general all-round excellence there is no country in the world which surpasses or even equals our own at the present time in its types of glass beakers and flasks.

The references to chemical glassware in this article have up to this stage been entirely to flasks and beakers, but the manufacturers of these articles have also manufactured various other types of article in resistance glass or in other suitable types of glass. The development of graduated apparatus, burettes, cylinders and many other forms had to take place from the beginning and to pass through the stage of infancy with its various complaints, but ultimately with much assistance from the Branch of the Ministry of Munitions and the National Physical Laboratory, the unsatisfactory varieties were eliminated and the manufacture put on a better footing.

In an article of limited scope there only remains space to make reference to glass tubing, since this is an important material from which all kinds of light blown scientific apparatus is produced, including test tubes, pipettes, absorption vessels, extraction apparatus and so on. The four firms who set out at the beginning to make chemical glassware also drew glass tubing. This art had not died out, fortunately, in this country, and several firms such as those like Messrs. S. and C. Bishop, Butterworth Bros., John Moncrieff, Ltd., and Tomey and Sons, had been engaged for a long time in the manufacture of gauge tube glasses, and their experience was valuable, as well as that of Messrs. James Powell of the famous Whitefriars Works, and one or two others. Glass suitable for resistance purposes, for X-ray tubes and for a variety of purposes had to be worked out. The Committee of the Institute of Chemistry made itself responsible for the early formulas, and manufacturers took these and adapted them to manufacturing conditions. Glasses which have to be worked up into scientific apparatus, thermometers, absorption bulbs, etc., can seldom be as resistant chemically as the glass for beakers and flasks, since ready working in the blow pipe flame is one of the characteristics demanded. Of course, a glass like Pyrex glass can be worked, although it needs an oxy-coal gas or other very hot flame for its working. Glass of suitable type is now manufactured by the four firms at present making chemical glass as well as by Messrs. Tomey, Messrs. Butterworth Bros., Messrs. Plowden and Thompson, and, we believe, also Messrs. James Powell.

A Commercial Tribute

The present situation may be summarised in a letter which I recently received from the President of the British Lampblown Scientific Glassware Manufacturers' Association, Ltd., who do not make the glass or glass tubing, but are only interested in obtaining supplies of satisfactory quality for working up into various types of chemical glassware, surgical instruments, thermometers, etc. The President, Mr. A. O. Jones, states that "Our members are unanimous in their opinion with regard to glass tubing used in connection with chemical and surgical glassware, that it is more than equal in general qualities to that made on the Continent. It is excellent as to durability, and its melting qualities in the flame; its qualities, too, remain more or less permanent, and little or no devitrification takes place. The glass is colourless and remarkably free from blemishes, such as lines, which is so common a feature in Continental tubing. The workers themselves prefer to work with British tubing rather than that of Continental manufacture.

"With regard to thermometers the tubing used by the members of our Association is now exclusively British, and this is so because we find that British capillary thermometer tubing is of much better and of more uniform quality than anything that can be got from abroad. The blue stripe normal glass used in the manufacture of thermometer bulbs and which is made by British firms, is equal in every respect, and perhaps in some respects even more than equal, to the Jena Normal 16 (111)."

Whilst it is a matter of very great credit to British glass manufacturers that in ten years' time they have established this industry on so satisfactory a footing, it is still more satisfactory to be able to state that there is no settling down by them in the idea that the job has been finally done. Research into the possibility of improving these glasses has continued both in the factories and also by scientific workers. Since 1917 the Department of Glass Technology alone has published no fewer than 21 papers involving the subject of the chemical resistance of glass, and several investigations dealing directly with glasses suitable for lampworking (that is, bench glass blowing purposes). The interest taken by the manufacturers themselves in the latest developments of scientific work is in itself an assurance of their intention not only to maintain a high standard of quality but to continue to improve their ware as and when new investigations point out the way.

Dyeing Prices at Rock Bottom

At a meeting of the committee of inquiry into the safeguarding application of hosiery manufacturers, held in London on Thursday, April 15, evidence was given on dyeing charges. Mr. W. Bodycote, under examination, said that if American figures were true, counsel's claim was correct that on one article submitted by witness, dyeing and finishing costs were 1s. 10½d. per dozen against a comparative American charge of 6d. Prices had come down during the last two or three years. It was generally considered in the trade that dyeing prices had come down as far as they could.

Some Chemical Aspects of Synthetic Resins.—(II)

By G. Malcolm Dyson, Ph.D., A.I.C.

The following is the conclusion of Dr. Dyson's article on the preparation and properties of synthetic resins. The first instalment appeared in the last issue of THE CHEMICAL AGE.

THE use of catalysts, and their influence in small quantities having been dealt with, it remains to discuss the results obtained by the addition of substances in considerable bulk—modifiers—which modify by simple admixture the properties of the finished resin. Glue, casein and albumen were among the earliest substances suggested for this purpose. The incorporation of gelatin or casein into the mix gives a resinous product which differs surprisingly little from normal unmodified resin. It is claimed, however, that a glossy lacquer can be prepared from it by solution in the usual varnish media followed by clearing with benzene. The coating is said to be unaffected by solvents or heat up to 150° C.

By the introduction of modifiers it was hoped to convert the brittle phenald resins into softer and tenacious rubber-like substances. This has been to some extent accomplished by the addition of the so-called vulcanised oils, but the products are by no means suitable as rubber substitutes, save for limited application in cases where strength is not a prime consideration, e.g., in the manufacture of rings for hermetically sealing foodstuffs, jars, etc. On the other hand, the addition of vegetable oils seems to toughen the final product, giving a substance that can be used with advantage in the preparation of varnishes. The phenald resins are incompatible with the natural varnish resins and oils, and cannot *per se* yield a good varnish in organic solvents. This difficulty can, however, be overcome by heating a mixture of equal parts of phenald resin and natural varnish resin. A reaction takes place and on cooling a resin is obtained which is soluble in all the usual media, giving a clear and homogeneous varnish. Such resins belong to the so-called "Novolak" class. An alternative method for their preparation is the polymerisation of the resin components in the presence of a modifying oil or resin. Thus if cresol, formaldehyde, chinawood oil and a drier are heated together a clear varnish resin is obtained. Similar products are obtained with other oils, including castor oil. By using as a modifier ground rubber a Baekelite III can be obtained which is very hard and insoluble, and which has exceptionally good electrical properties.

Effect of Modifiers

A host of other modifiers have been tried, some with considerable success, others with no apparent effect, save that of dilution. A summary of the more important of these is given in Table IV.

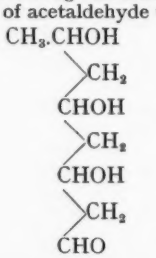
TABLE IV.

Modifier.	Solubility.	Fusibility.	General Properties.
Acetanilide	Insoluble	Infusible, but softens and can be welded	Heat stable and excellent insulator
Anhydroformaldehyde aniline	Insoluble	Softens on heating	Stable to heat
Azo compounds	Alcohol soluble	Fusible	Brightly coloured clear resins
Benzoic anhydride	Insoluble	Infusible	Tough and varnish-like
Chloro naphthalene	Insoluble	Softens, and can be welded	Stable to heat, and a good insulator
Cellulose esters	Soluble, but converted on heating to infusible and insoluble compounds		An easily moulded, non-inflammable, resistant, celluloid substitute
Chlorphenol	Insoluble	Fusible	Highly resistant to reagents
Cresyl phosphate	Easily soluble in alcohol	Fusible	A clear, easily worked varnish resin
Lactic acid	Soluble in acetone	Liquid	A syrup which can be incorporated with fillers and hardened up
Nitrobenzene	Insoluble	Infusible, but softens and can be welded	Heat stable, and a good insulator
Phthalic anhydride	Insoluble	Infusible	Very tough
Pyromucic acid	Partly soluble in alcohol	Infusible	A good vulcanite substitute
Resorcinol	Insoluble	Infusible	A good clear amber substitute
Sulphite waste liquor	Insoluble	Fusible	A good resin, but on heating gives a rubber-like substance
Vegetable ivory	Insoluble	Infusible	A bone substitute
Viscose	Insoluble	Infusible	Spins to a fine insulating thread
Xylene	Insoluble	Infusible	Good insulator

The phenald resins are utilised commercially mainly in the insoluble and infusible forms, although a quantity of the clear resins are used as cements. Among the principal uses may be mentioned the manufacture of varnishes and enamels, insulating blocks and media, wood impregnating fluids, lacquers, metallic protective paints, and in conjunction with various fillers for the manufacture of gramophone discs, brake blocks, etc. Thin fabrics soaked in the liquid resin and pressed in multiple thicknesses in hot moulds give tough boards that are used for the production of silent gears, clutch facings, etc.

Furfural Resins

The polymerisation of aldehydes to give resinous products has been known for a considerable period, and has constituted a characteristic reaction for some of them. Thus, for instance, in the presence of a trace of alkali acetaldehyde polymerises to a brown resin, and sebacic aldehyde, on standing, is transformed to a glassy polymeric mass which scarcely reacts as an aldehyde. The polymerisation of aldehydes probably takes place through an aldol condensation. Thus in the polymerisation of acetaldehyde the compound (11) has been



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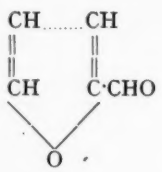


(12)

isolated. Among the aldehydes which undergo resinous condensations furfuraldehyde is, after formaldehyde, the most important (12). Manufactured from maize-husks (which contain a large proportion of pentosans, and therefore give a good yield of furfuraldehyde) this latter compound is a water-white, insoluble liquid, which resembles benzaldehyde very closely in its chemical properties. The condensation of furfuraldehyde with phenols, cresols, etc., gives rise to resins of the insoluble and infusible type. In many cases they are of a non-resinous nature, but in nearly all cases they are dark brown or black. The reaction between equal molecular proportions of the two components, especially in the presence of an acid catalyst, takes place very rapidly to give insoluble resins, which by reason of their rubbery nature are of little use; but if a large excess of the phenol is used, and the excess later removed by steam distillation a fusible black resin is obtained. This resin can be used as the basis of a black glossy varnish, or by pressure moulding, can be converted into a hard, infusible black material of considerable insulating properties.

TABLE V.

Substance used.	Catalyst.	Preliminary colour.	Rate.	Heat Liberated.	General properties.
o-Aminophenol	HCl	Violet brown	Slow	O	Solid and friable
Borneol	HCl	Violet	Slow	O	Solid and friable
Camphor	HCl	Red Violet	Very slow	O	No resin produced
Carvacrol	HCl	Red-violet	Moderate	++	Hard black solid
m-Chlorphenol	HCl	Dark green	Slow	O	Hard solid
p-Chlorphenol	HCl	Grey	Slow	O	Friable and brown
o-Cresol	HCl	Blue-violet	Moderate	++	Black solid
m-Cresol	HCl	Dark-blue	Moderate	++	Black & lustrous
p-Cresol	HCl	Blue-green	Slow	O	Black solid
Guaiacol	HCl	Brown-black	Slow	O	Exceedingly lustrous black solid
Hydroquinone	HCl	Black	Slow	+	Black
Menthol	HCl	Green	Slow	O	Black and spongy
α-Naphthol	HCl	Red-violet	Very fast	+++	Hard black resin
β-Naphthol	HCl	Blue	Fast	++	Hard & lustrous
o-Nitrophenol	HCl	Yellow-green	Slow	O	Yellow oil
p-Nitrophenol	HCl	Brown-black	Slow	O	Liquid, slowly solidifies
Phloroglucin	HCl	Brown	Fast	+	Black and brittle
Picric acid	HCl	Yellow-green	—	O	No reaction
Pyrocatechol	HCl	Blue-black	Fast	++	Black solid
Pyrogallol	HCl	Black	Moderate	+	Lustrous but brittle
Terpineol	HCl	Brown red	Slow	O	Brown solid
Thymol	HCl	Blue	Slow	O	Black solid

The condensation is a general one, and takes place with a great many phenolic bodies, besides phenol itself. In some cases the condensation takes place with great rapidity, in others only after a considerable time, and in the latter case without the liberation of heat. Table V gives a summary of the various phenolic condensation products which have been obtained with furfuraldehyde (see previous page).

The polymerisation of furfural *per se* can be brought about by the action of caustic alkali. It is usual to boil the aldehyde with a large excess (6–8 volumes) of 20 per cent. caustic soda. The solution gradually becomes a deep brown colour, and on acidification a black resin is precipitated. This resin is soluble in acetone and alcohol and on evaporation its solutions leave a glossy, deep black film. With various amino compounds furfuraldehyde condenses with great readiness. The resins obtained are valuable for the treatment of wood. Dissolved in solvents such as acetone, tetralin, or alcohol their application stains the wood evenly in shades from yellow to black, and dries with a smooth glossy varnish finish (Table VI).

TABLE VI.
Effect on white wood by one coat.

Polymerisation component.	In benzene.	In furfuraldehyde
Aniline	Light brown	Dark brown
α-Naphthylamine	Dark brown	Almost black
o-Toluidine	Medium brown	Dark brown
Xylidine	Red brown	Deep red brown
Acetone	Golden brown	Dark brown
Methyl ethyl ketone	Golden brown	Dark brown
Ammonia	Red Brown	Very dark brown
Sodium hydroxide	Medium brown	Black-brown

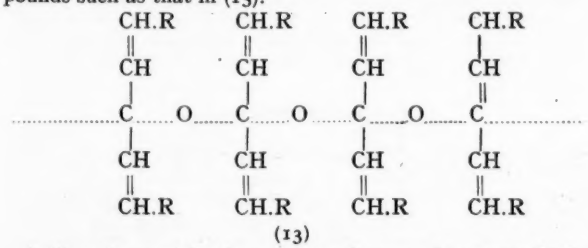
The Keto Resins

The application of several coats of the deeper resins will give a fine black enamel appearance. Of the same class, although of lighter colour, are the so-called " keto-resins," obtained by the polymerisation of aldehyde-ketone condensation products. These compounds, although interesting, have not received any extended industrial application. The chief of them are described in Table VII. :—

TABLE VII.

1st Component.	2nd Component.	Catalyst.	Properties.
Acetaldehyde	Acetone	KCN or K_2CO_3	Not resinous. CH_3. (CHOH). CH_2. CO. CH_3
Acetone	Formaldehyde	Trace of KOH	Keto butanol. CH_3. CO. CH_2. CH_2 OH
Acetone	Formaldehyde	Excess of KOH	Amorphous resins
Acetophenone	Formaldehyde	$Ca(OH)_2$	A mixture of solid and liquid resins
Cyclohexanone	Formaldehyde	Acid or alkali	Hard transparent resins soluble in organic solvents
Methylene-acetone	—	Warming	Colourless, hard glass-like solid. High refractive index. Used for lenses
Mesityl oxide	—	PCl_5	Soft resin
Methylethyl acetone	Formaldehyde	K_2CO_3	Honey-like syrup

Herzog and Kreidl investigated the ketonic resins comparatively systematically, and came to the conclusion that the group —CH=CH. CO— was conducive to the production of resins, or, as some prefer to put it, acts as a " resinophore." The unsaturated compounds, such as acrolein, methylene acetone, cinnamaldehyde, etc., are those that give resins most easily, but strangely enough the products obtained are still unsaturated, so that the investigators assume that the condensation takes place through the ketonic oxygen, giving compounds such as that in (13).



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Acid resins—synthetic or natural—are of comparatively little use for the manufacture of varnish, partly on account of their acidity, and partly on account of their lack of durability which seems to go hand in hand with the acidity. Thus ordinary common rosin (colophony) is only used as an adulterant in the cheapest resins. By condensing such resins with glycerol, the so-called ester gums are obtained, or synthetic resin esters, which have not only a very low acid number but are glossy and very durable.

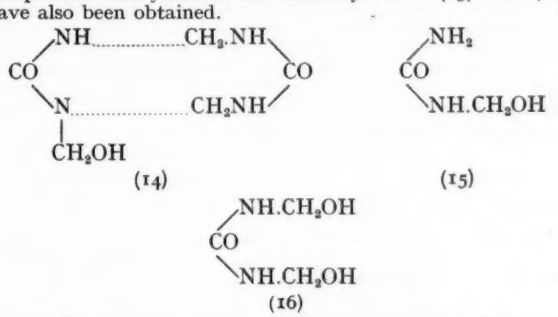
Since by this means rosin could be improved to such an extent that the ester gum from this source displaced the durable copals, especially in the manufacture of spar varnish, it was argued that the esterification of copals themselves should give rise to phenomenally resistant gums. Such an expectation has only been partially fulfilled, for although the esterified gums are hard, durable, and of a good electrical quality, the esterification cannot be conducted without to some extent " cracking " the fossil gums, while in some cases the whole boiling polymerises to a useless spongy mass.

Coumarone Resins

The condensation of certain semi-benzenoid hydrocarbons such as indene, and methyl-indene, and the furane derivative coumarone leads to the formation of resinous products. When properly purified these compounds have scarcely any colour, and in some cases remain permanently plastic. The majority of them are elastic in the extreme, and find considerable use in the preparation of varnishes and paints. Very durable spar, and hard floor varnishes can be made from coumarone resin with the addition of tung and linseed oil, and with cobalt, linoleate, or resinate as a drier.

The preparation of such diverse compounds as chewing-gum, printing ink, linoleum and waterproofing solutions utilises the bulk of coumarone resin. To obtain this resin, the solvent naphtha is fractioned several times until a clear water-white fraction B.P. 160–180° C. is obtained. This fraction contains a very high percentage of coumarone, and is dried and polymerised under very closely regulated conditions of temperature and rate of heating. The agent for polymerisation is sulphuric acid. After the condensation has taken place the tar is settled and the clear resin solution drawn off and purified from traces of acid by washing and drying. The oil is then distilled off in vacuo, steam coils being used to drive off the naphtha, and finally, when the latter has all been removed, live steam is blown in to distil over any naphthalene. The resin at the end of these operations is easily poured out into suitable moulds.

Among the remaining synthetic resins there are included those from urea and thiourea, which in view of the recent cheap large-scale production of the former substance, should have a considerable commercial importance. When urea and formaldehyde condense they yield a white amorphous substance which will melt easily and on solidification yields, in turn, a clear glassy mass. The so-called " organic glass " which has considerable elastic properties, is prepared in this manner. From the point of view of the constitution of synthetic resins the ureaform resins are of more than a slight importance, since several definite chemical stages have been isolated from the condensation. Thus Goldschmidt, in condensing formaldehyde with urea hydrochloride, obtained a white amorphous compound of the formula $C_5H_{10}N_4O_3$, which is probably of the constitution (14), while the two compounds methylolurea and dimethylolurea (15) and (16) have also been obtained.



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In addition, there are a great many substances that give rise to resinous condensation products with formaldehyde in the presence of catalysts; but these have not, as yet, attained to any commercial importance.

Testing Synthetic Resins

Naturally, the physical aspects of a synthetic resin are the most important criteria in testing and evaluation, and in addition the purpose for which the resin is destined to be used must be known before any definite opinion as to commercial value can be given. Generally speaking, the synthetic resin

must be "tempered" by mixing and heating with natural resin before it can be used in varnish composition, and resins for the latter purpose should have the following characteristics:

1. *Solubility.*—The resins should be readily soluble in varnish oils and thinners, although if insoluble at ordinary temperatures the resin is still of use if it will mix with the hot oils in the kettle.
2. *Compatibility with driers.*—A good varnish resin should be capable of dissolving small quantities of manganese or cobalt salts (stearates, resinates, etc.), which catalyse the formation of a hard and durable film.
3. *Film elasticity.*—A varnish resin may be tested for this quality by pouring a small quantity of its solution on to a sheet of plate glass and allowing the film to dry in a vertical position. When dry, a good varnish resin will come off in a tough spiral coil on scraping, while an inferior resin flakes and splinters.

For moulding compositions entirely different qualities are desirable—infusibility and resistance to chemical reagents being the usual tests of a suitable moulding composition.

In the case of resins such as synthetic ambers, etc., which are likely to come into contact with the lips or body, care must be taken that a resin is chosen which will not give off, even on continued use, traces of dye, phenol or formaldehyde, or else a disagreeable form of dermatitis is likely to be set up.

Resins intended for electrical use are chosen for their high dielectric constant and resistance. The best criterion is the breakdown voltage at which the material softens, or "pin-holes," becoming a conductor. This is usually determined by floating a deep cup of the material in a bath of mercury and applying a steadily increasing voltage across the mercury bath and some mercury contained inside the cup.

Chemical methods of testing synthetic resins can scarcely be said to exist, although there is little doubt that in due course, when these resins are more widely used, a scheme of analysis with suitable tests will be devised to meet the requirements of standardisation.

Oil Production in Venezuela

Resources of the Maracaibo Basin

In a paper read before the Institution of Petroleum Technologists, on Tuesday, April 13, Mr. Campbell G. Hunter discussed "The Oilfields of the Maracaibo Basin."

Mr. Hunter said that the Maracaibo basin was a horse-shoe shaped area, bounded on the west, south and east by mountain ranges, which were offshoots of the main Andean system, and on the north by the Gulf of Venezuela or Maracaibo. Roughly, the area embraced by the Maracaibo basin was about 25,000 square miles, or 33,000 square miles if the State of Falcon were included. The basin corresponded with a vast geosyncline, the centre of which was Lake Maracaibo. Whilst the occurrence of oil seepages in Venezuela has been known since the early days of the Spanish occupation, it was not until 1878 that the first concession was granted by the Venezuelan Government to the Compañia Petrolera de Táchira. In 1907 the Vigas Concession was granted, covering approximately 4,500,000 acres. Subsequently this concession was acquired by the Colon Development Company, which was now controlled by the Royal Dutch-Shell Group. Since then other concessions had been granted. It was not till 1912 that any serious exploration work was undertaken, but from that time development had been rapid.

Petroleum Laws

The broad conception of the Venezuelan Government in dealing with its vast potential oil resources has been that of stimulating and encouraging foreign capital to come into the country. The laws relating to concessions had been framed on bold, simple lines, with the result that, within comparatively few years, more active prospecting and development work was taking place in the Republic than in many other countries that had been developing their oil resources far longer. Briefly, concessions were granted for a period of forty years, with three years given for preliminary exploration work. At the end of the exploration period half of the area under concession had to be returned to the Government and was treated as National Reserve. These National Reserves were now turned over to a Venezuelan company, called the Compañia Anónima Venezolana de Petroleo, whose policy was to re-lease such National Reserves or enter into drilling agreements for their development. A royalty of 10 per cent. on production was payable at the option of the Government either in cash or oil.

Of the major oilfields, the Mene Grande field deserved first mention, in view of its having been the first to be systematically developed, though, as regards output, the La Rosa Field was now of greater importance. The Mene Grande Field, which was operated by the Caribbean Petroleum Company, a Royal Dutch-Shell subsidiary, was situated some twelve miles inland from the lake, with which it was connected by means of a narrow gauge railway. A striking feature of this field was the remarkable vertical depth of 1,800 ft., down which the oil producing series had been followed, without as yet any indication of edge-water. Up to the end of 1925 some 18,000,000 barrels of oil had been shipped, equivalent to an average of nearly 315,000 barrels per well. Of the 60 odd wells drilled to date, four had yielded to the close of 1925, 398,000 tons, 259,000 tons, 364,000 tons and 108,000 tons respectively; the last well being the southernmost on the property, and the production given was that for six months only, at the end of which it was still flowing at the rate of over 700 tons a day.

La Rosa Field

This field was located on the east shore of the lake. The first well at La Rosa was started in 1915, but no development of any importance took place until 1922, when Barroso No. 2 was brought in at a depth of 1,495 ft., and flowed a million barrels in nine days. The success attaching to this well furnished another example of the fortune which might attend oil prospectors, since it had been commenced eight years previously and abandoned at a depth of 900 ft. It was only in 1922 that drilling operations were resumed, apparently with a view to utilising the derrick, which had been left standing when the well was shut down.

With the completion of this remarkable gusher, which undoubtedly constituted the turning point in the oil industry of Venezuela, a tremendous impetus was given to oil activity in the neighbourhood. Thus the Lago Petroleum Corporation at once started drilling on its Maritime Concession in the lake, opposite the little village of La Rosa. The success which attended this well was now historic, and had resulted in about 125 wells having been drilled to date in its immediate vicinity, the resultant production from which, to the close of 1925, amounted to 12,000,000 barrels, exclusive of that of Barroso No. 2. Many other fields had also been developed.

Owing to the mouth of Lake Maracaibo being obstructed by two shallow bars, the shallower of the two permitting vessels drawing only 11½ ft. to enter, all oil produced within the Maracaibo basin area had to be handled in shallow draft tankers, which discharged their burden at some convenient spot outside the lake. The most highly developed ocean terminal was that of the Royal Dutch-Shell group in the Island of Curaçao, where, in addition to extensive storage, a large refinery and cracking plant had been erected. The round trip from La Rosa to Curaçao and back occupied four days.

Venezuelan Production

The remarkable progress in the development of the oil industry of Venezuela was reflected in the fact that within the comparatively brief space of six years, an annual production of close on 20,000,000 barrels had been developed, having risen to this value from a 1920 production of 450,002 barrels. The estimated barrel production in 1925 of the various companies was: Caribbean Petroleum Co., 6,250,000; British Controlled Oilfields, Ltd., 3,375,000; Venezuelan Oil Concession Co., Ltd., 3,300,000; Venezuelan Gulf Oil Co., Ltd., 1,750,000; Lago Oil and Transport Co., 4,460,000. At the present rate, there could be little doubt that the production of the Maracaibo basin would substantially exceed 30,000,000 barrels in 1926, and, therefore, place Venezuela as the fifth if not fourth largest producer in the world.

Mr. Francis Howard Carr

New President of the Society of Chemical Industry

MR. FRANCIS HOWARD CARR, C.B.E., F.I.C., a director of The British Drug Houses, Ltd., has been nominated to the office of President of the Society of Chemical Industry, in succession to Mr. W. J. U. Woolcock, and will be elected at the annual general meeting in London in July.

Mr. Carr received his early training in chemistry, physics, and engineering at the City and Guilds Institute, London, and his training in research in the Research Laboratory of the

MR. F. H. CARR.

Pharmaceutical Society. There he became the first Salters' Fellow, and he was afterwards appointed Salters' Fellow in the Research Laboratories of the Imperial Institute, where he specialised on the active principles of drugs and became a leading authority on alkaloids. Mr. Carr's name has been associated with published researches on the alkaloids of aconite, ergot, hyoscyamus, and ipecacuanha, and either alone or in collaboration he was the first to prepare or isolate pyracotinine, oxonitine, nor-hyoscyamine, etc. After being engaged for six years on research work he was appointed chief of the chemical department of Burroughs, Wellcome and Co. Soon after the outbreak of the war he became associated with Boots Pure Drug Co., Ltd., in developing the manufacture of fine chemicals and war materials. He resigned his position with that firm at the close of the war, and, early in 1920, joined the board of directors of The British Drug Houses, Ltd.

Mr. Carr's technical achievements are notable in the field of fine chemical manufacture. He has expended his energies—and with marked success—in the direction of making this country independent in the domain of fine chemical manufacture. He is responsible for a large number of organic chemical syntheses and other processes, notably in connection with drugs and medicinal chemicals, and also, during the war, with poison gases. During the war he played an essential part in the production of British box respirators, and was responsible for setting up the manufacture of saccharin in this country. He has identified himself early and late with the chemistry of alkaloids, not only on the academic side, as mentioned previously, but, since entering industry, with the manufacture of them, having organised in this country the manufacture of alkaloids (with the exception of quinine, morphine and strychnine, the manufacture of which was already established).

The developments that have taken place in the manufacture of fine chemicals by The British Drug Houses, Ltd., are well known, and for these recent developments and the conspicuous success that has attended them Mr. Carr has been largely responsible. He has developed the production of fine chemicals on every sort of scale, from the most complex organic syntheses made in small quantities up to the large-scale production of fine chemicals of the highest grade.

One comparatively recent and very notable achievement is his success in establishing the commercial-scale manufacture of insulin. Although the Americans had gained six months' start in this manufacture, the B.D.H., by means of their scientific and technical resources, succeeded in achieving large-scale production so rapidly that they were able to put "A.B." insulin on the market within three months of the date when experimental manufacture was begun. Mr. Carr has since devoted himself to perfecting the yield and purity of the commercial product, with the result that the degree of purity of "A.B." insulin is now such that one clinical unit contains only 0·00005 gram of solid insulin hydrochloride. A noteworthy contribution to the literature on insulin is the paper on "Insulin and its Manufacture," which Mr. Carr presented at the Annual Meeting of the Society of Chemical Industry at Liverpool, in July, 1924. Other animal and gland products with the industrial production of which Mr. Carr has identified himself are the hormones of pituitary, thyroid (thyroxine) and other glands.

That Mr. Carr unites in his intellectual capacity and equipment both scientific attainments and sound and wide culture was amply attested by his Harrison Memorial Lecture delivered in 1919. His recent Streatfeild Memorial Lecture, delivered in December, 1925, at the Finsbury Technical College, is noteworthy for the valuable recommendations it contains as to the type of training necessary for the industrial chemist. Mr. Carr strongly advocates special courses for works chemists in which engineering is associated with chemical training. He does not suggest this particular type of training for all chemists, but urges that there should be a certain number trained on these lines, and maintains that the existing type of training for chemists generally is too stereotyped.

Among the many offices that Mr. Carr has held may be mentioned his services on the Council of the Association of British Chemical Manufacturers, of which council he has been a member since its inception, and on the Councils of the Chemical Society, the Institute of Chemistry, and the Society of Public Analysts, of which he has been vice-president. The value and appreciation of his work on the Council of the Society of Chemical Industry, of which he is at present a vice-president, are sufficiently indicated by his nomination now to the office of president.

Canada's Mineral Industry in 1925

Progress Recorded

THE preliminary report of the mineral production of Canada in 1925 is just issued. Great progress was made in the industry. In the aggregate for the year, the total yield from Canada's mines, quarries, oil and gas wells, metallurgical works and enterprises such as the manufacturing of cement, brick and other clay products, was valued at $224,846,237, an increase of $15,262,831 over the total of $209,583,406 for 1924, and well towards the record valuation of $227,859,665 attained in 1920, when the average range of metal prices was approximately 35 per cent. higher than in 1925. In fact, had it not been for a change in the method of computing the production of nickel, the value of the output as reported for 1925 would have been in excess of the previous record. Metal mining experienced a boom which carried the total value of production in this field to a total of $117,189,262, an increase of $14,782,734 above the total for 1924; exclusive of coal, non-metals, at a value of $22,342,678, showed an increase of $4,140,657 over the figures for 1924.

Among the metals, the remarkable advances in the production of gold, lead and zinc were most outstanding; improvement in outputs marked the totals for nickel, copper and cobalt; silver showed little change.

Sales of asbestos increased during the year, so that the total for that commodity rose about 64,000 tons to 290,121 tons, valued at $8,995,854, an increase of $2,285,024 above the sales in the preceding year. Advances in the production of other non-metallic minerals occurred in the figures for fluorspar, graphite, gypsum, natural gas, petroleum, quartz or silica, natural sodium sulphate and carbonate, salt, talc and soapstone.

Laboratory Furnishings and Scientific Instruments

A Survey of Modern Productions

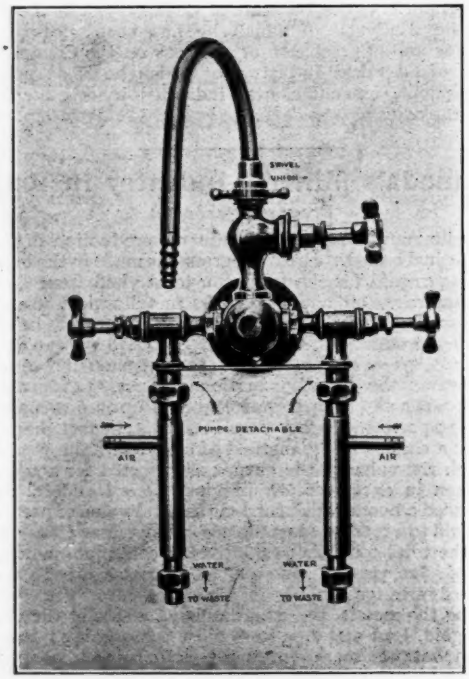
We give below short descriptions and illustrations of various laboratory furnishings and allied scientific instruments now offered by British firms. The selection is typical of the wide range of products available from home sources, and demonstrates indirectly the increasing recognition and application of research.

General Furnishings

With the gradual realisation of the vital importance of the chemist in industry, and the wider adoption of research, the question of laboratory fittings is an important one. Fortunately we have several British undertakings that can supply the most exacting requirements with credit. A firm that includes among its clients such efficient research bodies as the Government stations, the N.P.L. and the laboratories of the leading Universities throughout the United Kingdom and overseas, is Brown and Son, Alembic Works, Wedmore Street, London, N.19. This well-known scientific furnishing firm has completely equipped scores of laboratories for specific industries and for general research. It is impossible, of course, to mention even all their leading products, but points of particular interest may be recorded. The burette rack and storage cabinet for standard solutions combines a strong gunmetal rack with spring clamps, bottles and burettes, and the latest compressed air device for forcing up solutions. For isolated premises where coal gas is unobtainable or undesirable the petrol-air gas system has found much favour. Brown and Son's plant is particularly compact and simple.

A new form of combined pump and water standard with new pattern metal pumps is worthy of note. The firm claims that these pumps are as efficient as any glass type. The pumps are detachable, with a control to each. We believe these fixtures were fitted for Professor Perkin at Oxford University.

A new four-way gas distributor gives added efficiency.

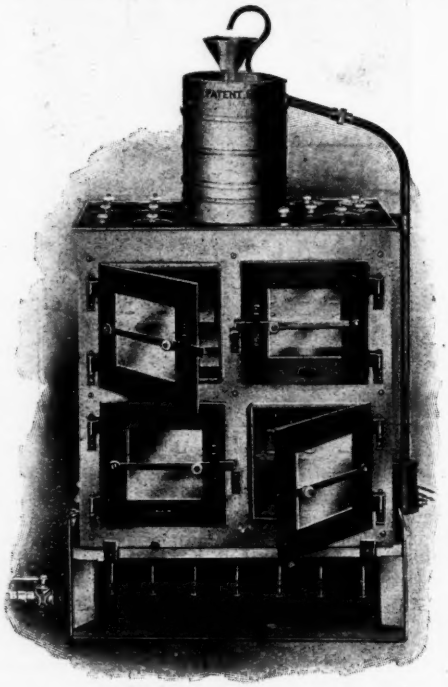


Combined Pump and Water Standard.

In oxidised gunmetal it is fitted with pilot burner or Bunsen in centre and a master tap controlling all the others.

Autoclaves are a speciality, and the company has produced a high pressure instrument which does not necessitate the usual continued use of spanners. They are made with an internally projecting rim and oval shaped top aperture. The cover fits and is lightly held by a simple hand screw. Internal pressure causes the cover to be forced up against the rim and the higher the pressure the more secure becomes the joint.

In ovens the combination of steam oven, evaporating bath and still is noteworthy. The still head produces 6 pints of distilled water per hour when consuming 40 c. ft. of gas. At one end a removable plate is fixed exposing the inside of bottom of oven for cleaning. Another advantage is to run hot water



Oven and Still.

into a storage tank, thereby always having a supply of hot water. Each compartment is ventilated with opening for thermometer. These ovens may stand on wall or table, merely requiring water supply over funnel, and any number or shape compartments can be made.

All parts where corrosion takes place through distillation are readily removable for cleaning. Where steam at a pressure of 10 lb. or any pressure above is available, a removable coil is fitted in bottom of oven, being a very economical method of obtaining heat in drying oven and distilling water. For colonial and foreign use there is fitted a suitable oil blast furnace where gas and steam are not obtainable.

Gas Calorimeters

The Fuel Research Board have employed and found satisfactory for providing a continuous and automatic record of the calorific power of gas passing, a Simmance's recording calorimeter of Alexander Wright and Co., Ltd., engineers, 1, Westminster Palace Gardens, Artillery Row, S.W.1. Tests by it can be made without stopping the record, which is thus confirmed for accuracy. Results are given in B.T.U. per c. ft. or calories per c.m. The instrument demands an absolutely invariable flow of water and a special contrivance is fitted which completely overcomes any difficulties of furring or dirt accumulation in the orifice.

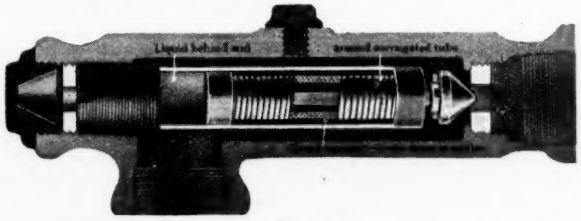
Considerable interest has attached recently to the detection of carbon monoxide, and not a few industries have discovered

the possibilities of the occurrence of this gas. The company produces a detector and alarm that have been found highly efficient with such small quantities as one part of gas in two thousand. It depends upon the utilisation of the heat of oxidation of the carbon monoxide in the atmosphere. This is effected at the expense of the requisite amount of oxygen in the air by means of the catalytic action of certain specially prepared granules situated in the oxidation chamber. The heat is communicated to a bi-metallic strip, whereby it assumes a small curvature. One of the electrical contacts is carried on the end of this strip, the other is carried upon a similar strip which acts as a compensator for any changes in atmospheric temperature. The distance apart of the contacts is adjustable and the circuit is completed by the bending of the bi-metallic strip, which is exposed to the heat of oxidation.

The official N.P.L. standard photometer is handled by Alex. Wright and Co. and dead beat indicators for vacuum or pressure, gravitometers, and gas analysers are other productions.

Elimination of Steam Waste

An investigation of works efficiency invariably reveals waste in unexpected places, and it is not improbable that while much attention is paid to the economic working of intricate plant and processes, steam is wasted extensively. This is the more remarkable because there are now traps on the market that are of simple but most trustworthy construction. An example is the "Sarco" steam trap of the "Sarco" Engineer-

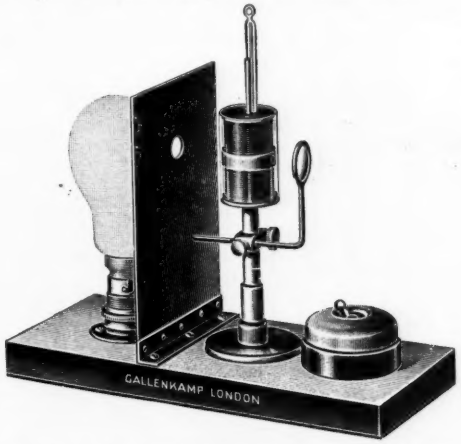


ing and Trading Co., Ltd., 36 and 38, Kingsway, W.C.2. This depends for its action on the expansion of a fluid very sensitive to fluctuations in temperature, whereas most expansion traps rely upon the expansion of a less sensitive metal part. A special feature is the corrugated tube around the piston rod, shown in section herewith. This is fixed with a fluid-tight joint to the piston and cartridge end, and its function is to act as a spring to open the valve when the fluid contracts. Owing to the introduction of this corrugated tube, the piston rod may be an easy fit without loss of fluid, as same is excluded from the interior, and therefore cannot escape; moreover, there is no jamming or seizing of the piston rod, thus ensuring the instantaneous action of the valve under the influence of live steam or condensate. There is no friction because of the entire absence of levers and stuffing boxes. The trap is easily cleaned, without disconnecting, by simply blowing steam through. The trap will operate continuously, and breakdowns arising from corrosion of working parts, leaks, etc., are completely avoided.

The company also produce automatic (CO_2) recorders with low initial cost, low cost of maintenance, accuracy to within ½ per cent., simple and super-sensitive action and special facilities for easy reading; also steam load indicators, steam meters, and distance thermometers. The Bourdon tube of these latter instruments is of seamless phosphor bronze and the pen of machined brass, thus ensuring absolute accuracy. In all "Sarco" recording and indicating thermometers no compensation of the capillary tube is required, and the tube is guaranteed to be quite free from any influence of surrounding temperature, however extreme.

Molecular Weight Apparatus

Among the extremely wide range of other laboratory equipment produced by A. Gallenkamp & Co. Sun Street, Finsbury Square, London, special mention should be made of the new electrical apparatus for the determination of



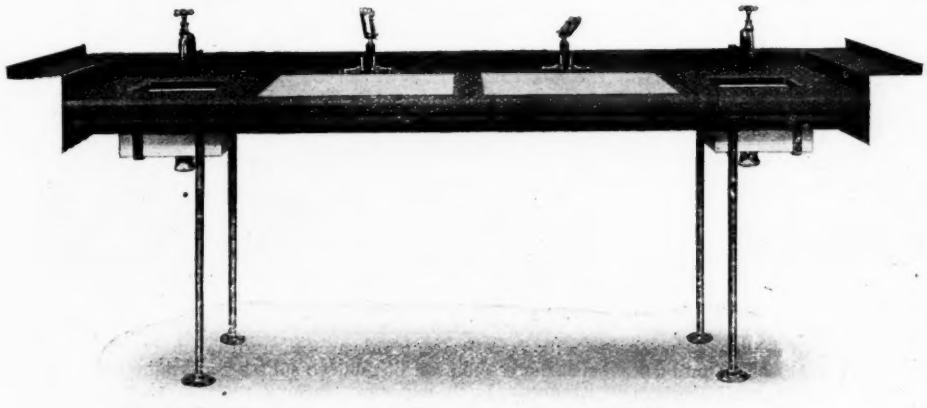
molecular weights by Rast's camphor method, by Dr. F. A. Mason, F.I.C., an illustration of which is reproduced herewith.

It may be mentioned that the company has developed an extensive field in electrically heated apparatus, and they claim the advantages of the absence of flames and fumes, the cleanliness and portability, ease of temperature control, increased life of copper vessels, etc. There are electrically heated sand and water baths, electric soxhlet baths and a wide range of ovens, hot plates, and immersion heaters, etc.

Sectional Laboratory Benches

One of the greatest advantages of modern laboratory benching is the adoption of the unit principle, whereby alterations and expansions can be met with the smallest inconvenience. The units are of stock size, can be supplied quickly and avoid costly fitting and delay occasioned when each addition entails specially made furniture.

Wood, earthenware, tiles, and metal are now used for laboratory benches. A sectional laboratory bench of metal throughout is made by R. W. Munro, Ltd., and obtainable through the Laboratory Equipment Co., 310-312, Regent Street, W.1. The units are so arranged that they may be assembled on ordinary standard gas tubing and the arrangement of them can be altered easily at any time. The sunk recess may be



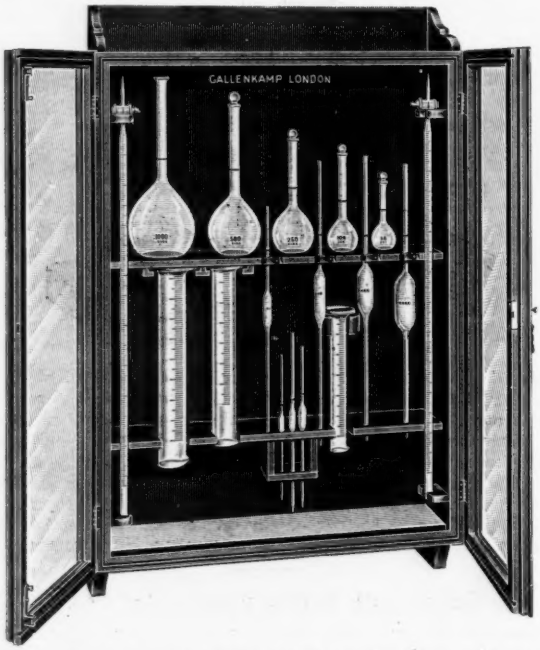
METAL LABORATORY BENCH.

fitted with linoleum or black glass as desired. The bench has a glazed earthenware sink with watercock, and the whole of the surfaces are finished in acid-proof crystal black enamel. The gas and water cocks and electric light brackets are serviceably produced in dull nickel plate.

The well-known "Technico" laboratory benches, by A. Gallenkamp and Co., Sun Street, Finsbury Square, London, are worked on the unit principle, and have been found invaluable for the economical and gradual building up of a laboratory. The unit system also offers easy transport and fixing facilities when fixing or altering the formation of benching. All connections are supplied complete ready for immediate connection. The benches have well oiled teak tops and the usual bottle racks.

Minimising Standard Glassware Losses

To minimise loss by breakage of "Standard" glassware, which is expensive and should be kept apart from ordinary glassware, Gallenkamp and Co. recently designed the "Technico" Standard glassware cabinet, fitted with glass doors and opal draining board and furnished as illustrated. The cabinet can also be obtained unfurnished, and it has been found in practice to produce considerable economies.



Technolite is a special material of the company, and enters into the construction of various products. It is as hard as crystal and possesses a brilliant fire-polished surface, which acids or alkalis cannot stain, and which can be kept clean and sterile with minimum effort. Cast in sheets up to 108 in. by 40 in., in thickness from $\frac{1}{4}$ in. to 1 in., it can be cut, bent to avoid sharp angles, drilled with holes to take fittings, and edges bevelled and polished. It is made snow white in all thicknesses, and jet black in $\frac{1}{16}$ in. to $\frac{3}{4}$ in. It is suitable for bench or table tops, shelves, etc., for bacteriological work, and testing of foodstuffs, etc., also for titration benches.

Illumination in Microscopy

With the increased use of the microscope in all phases of research, it is particularly gratifying to record not only remarkable progress on the actual instruments, so that lenses and fittings compare with the best foreign products; but that there have been successful attempts to remove some of the inherent difficulties of microscope work. The problem of suitable illumination has seriously handicapped workers in the past, but now the K.B.B. quartz mercury vapour lamp offers a source of monochromatic illumination of absolute steadiness, great intensity, and with the light under complete control. The fused quartz burner tube is not exhausted, but works under atmospheric pressure, thus eliminating defects sometimes associated with the vacuum type of mercury lamps. No mechanical devices are required for starting the arc, and the Thermal Syndicate, Ltd., claims that the lamp has practically unlimited life. The lamp may be operated off a 5 ampere plug on any D.C. house supply, and it is particularly suitable for photo-microscopy. In addition to the obviously wide range of scientific uses it may be mentioned that the lamp is also a rich source of ultra-violet radiation, and since fused quartz is transparent to rays of very short wave-length, the lamp is particularly valuable to research workers requiring light in the ultra-violet and extreme ultra-violet regions of the spectrum.

Acid-Proof Ware

No survey of modern laboratory equipment would be complete without reference to acid-proof ware—a phase of furnishing that has developed considerably of late. Typical of the efficiency of such products we may outline the properties of "Vitreosil," produced by the Thermal Syndicate, Ltd., Wallsend-on-Tyne, which has also valuable heat-resisting properties. It does not crack or fly, even when cold water is poured into a red hot basin. It is 99·8 SiO_2, is acid-proof, and absolutely insoluble in water. "Vitreosil" dishes are constant in weight and will stand 1,200° C. permanently, and much higher temperatures for short periods. "Vitreosil" may generally be used as a substitute for platinum, is one of the best insulators of electricity and at high temperatures is claimed to be unequalled. Transparent "Vitreosil" is also produced and it only remains to add to these numerous valuable properties, the fact that it is made by British workmen in a British factory by a British process. As may be imagined, this substance finds extensive use as tubing, test tubes, crucibles, dishes, plates, boats, beakers, muffles, trays, etc.

Colour Identification

The need for a definite standard of fastness to light in colouring materials is essential. In the past it has been practically impossible to obtain results comparable with one another, but this difficulty has now been largely overcome by the "Fade-Ometer" of Kelvin, Bottomley and Baird, Ltd., 51-52, Fenchurch Street, London, and Glasgow. In laboratories especially the instrument can be used not only for fading tests, but for other purposes requiring a powerful light rich in solar-like rays and of constant intensity at all times. For rapid actinic action the Fade-Ometer simulates sunlight, it is claimed, more closely than any other artificial light. It utilises the violet carbon arc which is controlled and maintained absolutely constant by automatic mechanism contained within the instrument cabinet. The arc stream plays between special electrodes and develops a spectrum containing the ultra-violet and other rays found in the spectrum of sunlight. Almost of the same actinic properties as sunlight, this arc affects all colours and produces chemical reactions as in sunlight. These light characteristics, however, never vary; they are identically reproducible, hence the possibility of an absolute standard. The cabinet surrounds the arc and encloses all of the controlling mechanism. It has a series of forty exposure openings, equally spaced from the arc at a distance based upon a scientific calculation of relative sun and arc light values and distances. Each exposure opening receives identically the same volume of light per unit of area, thus providing for forty identical tests at one time.

THE FADE-OMETER.

Of allied interest is another instrument handled by the

company—the K.B.B.-Macbeth artificial daylight lamps. No attempt has been made to " standardise daylight " which varies in colour with changes in the conditions. The colour filters in these lamps are graded over a similar range, so that

THE DAYLIGHT LAMP.

any desired daylight equivalent can be supplied. The average demand has been met with an " overcast sky " equivalent. If the purity of the light from any lamp does not meet the desired conditions, the proper filter can be furnished without additional charge. Sufficient to add that these lamps find application in Leeds University and in numerous research laboratories.

Water Testing

It is perhaps unnecessary to-day to point to the need for water testing in industrial and scientific work. There is, fortunately, at the present time a greater realisation of the economies in production costs and the greater accuracy in research that follow upon careful analysis of water.

In this connection the productions of Sofnol, Ltd., Westcombe Hill, Greenwich, are indicated as this company not only offers a comprehensive range of apparatus, but also all the necessary reagents and other chemicals. Further, their technical staff is in a position to offer assistance on water treatment for any purpose. Apart from flasks, beakers, pipettes, and other necessary glasswork the firm specialises in complete cabinets of apparatus for estimating hardness and alkalinity of treated or untreated waters, for free oxygen tests, for the estimation of plumbo-solvency, etc.

FIG. 1.

We reproduce an illustration of a complete cabinet for the estimation of free oxygen by Winkler's method (manganous chloride and sodium thiosulphate) (Fig. 1) and also the plumbo-solvency apparatus (Fig. 2). Water from peaty ground is nearly always acid and has a corrosive action on lead pipes and tanks. The water to be tested is passed over lead shot, contained in the " U " tubes, and the amount of lead (if any) taken up by the water is estimated by matching the colour produced with sodium sulphide against a standard lead solution. This method has been employed in the laboratories of Sofnol, Ltd., and has proved to be both simple and accurate.

For testing hardness the company also produces a special soap that does not become cloudy or deposit any sediment when exposed to cold, and therefore maintains its original strength indefinitely. It gives a brilliant characteristic lather

FIG. 2.

which does not readily break up in the same way as the lathers obtained from some ordinary soap solutions. This is a distinct advantage when determining the hardness of a water and increases the accuracy and delicacy of the process.

Contrast Filters

It has been felt for some time that the use of dyed gelatine filters for scientific work leaves much to be desired. In view of this fact, Chance Brothers and Co., Ltd., Birmingham, decided to see how far such filters could be replaced by means of pot or " through-coloured " glasses. This decision entailed long and elaborate investigations into the effect of different colouring oxides in glass in order to find the most suitable combination to give the desired high transmission and sharpness of " cut " in the spectrum.

These glasses are free from the objections frequently raised against gelatine filters, in that it is impossible for them to fade on exposure to light, and there is, further, no risk of their melting when placed near a light source, particularly in tropical countries. They are available in sheet form with a surface similar to ordinary window glass. They will be found of service for microscopic work, both visual and photographic, and in general for all purposes where a reasonably narrow spectral region needs to be isolated.

Automatic Temperature Control

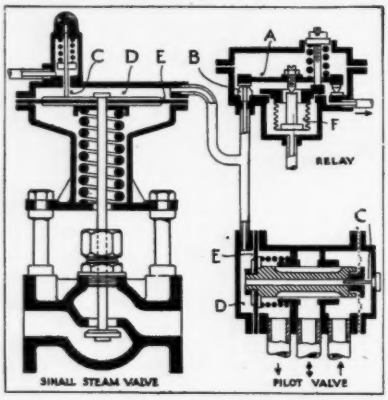
The automatic control of temperature is a phase of science that is rapidly developing, and British regulators are well up to the requirements of the various industries. There are certain circumstances where hand control is perhaps best. A case in point is that of certain dye vats that require to be kept at a " gentle simmer." This fluctuates with a rising or falling barometer by perhaps two or three degrees, and hand control of the temperature may possibly be more simple than the frequent adjustment of the regulator. On the other hand, a great industrial concern recently ordered an " Arca "

reducing valve for their sulphate of ammonia process, and by reason of the steady pressure, it was found that the valve paid for itself in a very short time. British Arca Regulators, Ltd., London, employ a simple hydraulically operated relay.

To operate the relay, an impulse is obtained by the direct expansion or contraction of a metal or other element in direct contact with the fluid, the temperature of which is to be controlled. Its action, therefore, is instantaneous, there being no time lag, as is the case with elements depending on the expansion of a volatile liquid held in a containing tube. It is sensitive to changes of temperature of less than $\frac{1}{4}$° F. The construction is simple, and yet it is not a mere laboratory instrument, but can be used under the roughest conditions.

The temperature regulators will maintain constant temperature of air, gases, and fluids at any point between 32° and 800° F., and are specially suited to dye vats, de-aerators, gas condensers, etc. Humidity regulators are employed in paint and varnish, textile, and other plants, and are sensitive to $\frac{1}{2}$ per cent. humidity. Low pressure regulators and high pressure regulators with a range of from absolute zero to 300 lb. per sq. inch gauge are sensitive generally to less than 1 per cent. The range of industries in which these products find extensive application includes—oil refining, dye-making, gas, rubber, paper, impregnating processes, air conditioning, colour fixing, etc. The gas industry uses these instruments as retort-house governors.

It will be seen from the diagram reproduced that in these instruments large regulating valves, dampers, etc., are moved by a hydraulic cylinder, controlled by a pilot valve



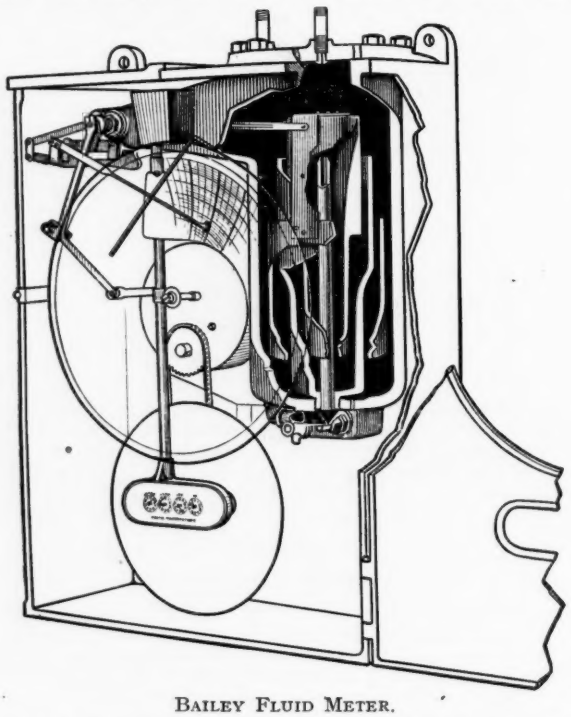
Diagrammatic Representation of Arca Relay.

operated by the diaphragm E, as in the case of the small steam valve. In the diagram both the pilot valve, for hydraulic cylinder, and the small steam valve are shown as connected to the relay, but it should be observed that the two items are quite independent; *i.e.*, a small compact valve does not require a pilot valve to work in conjunction with it.

Flow Meter Measurement

The "flow meter" principle is the one that can be applied to the measurement of steam and other fluids in large quantities to obtain a continuous record of the rate of flow. This principle consists in producing a differential pressure which varies in a definite and known relation to the rate of flow, and then measuring the differential pressure in terms of weight or volume as desired.

In the Bailey meter of Industrial Combustion Engineers, Ltd., Astor House, Aldwych, the differential pressure is produced by a thin plate orifice placed in some convenient flange. The orifice is entirely different from the restricted opening that has previously been used in metering fluids. Through research the fact has been substantiated that orifices produce accurate results and do not choke the flow in the least, nor introduce as much resistance as does the ordinary valve, The orifice is made of Monel metal for steam, water, oil, brine, and many other fluids. Nickel orifices are used for most gases, but other material can be used, depending upon the chemical properties of the fluid or gas being metered. In many cases it is desirable to know the pressure or temperature of the flowing liquid. These can be recorded on the same chart with the rate of flow so that the meter chart record gives the whole story of the operating conditions. The steam flow in the Bailey boiler meter is recorded as a red line and



Bailey Fluid Meter.

the air flow as a blue line. When the boiler is generating at a maximum efficiency the lines coincide regardless of load fluctuations. Loss of efficiency through either excess or deficiency of air is immediately recorded. The control of air supply and the saving of fuel commend these meters to all works.

A New Recording Pyrometer

The value of an instrument making automatically a permanent record of temperature is becoming widely recognised in connection with the majority of industrial heating processes. A recorder has also an additional advantage in that, by the slope of the line, it shows where the temperature is going and how fast it is changing, most important information to the furnaceman because it tells him how to adjust his heating.

Dial Recorder.

Recorders would doubtless have been much more widely adopted in many instances if it had not been for their cost and complication. A notable step has been made in the direction

of simplicity and the corresponding low cost by the Foster Instrument Co., of Letchworth, in the production of the new dial recorder.

The method by which a pyrometer recorder makes the record line is a governing factor in the design; much of the complication in past designs has been in connection with the method of producing the record line. In the dial recorder, as illustrated, a stylus, situated behind the chart, is deflected in accordance with the temperature to be recorded. Between the stylus and the chart is a sheet of special " carbon paper," the stylus is tapped forward against the glass and leaves a dot on the underside of the chart; as the chart is translucent the record line is clearly visible from the front. The dots, which are made twice per minute, join into a continuous line.

The moving system of the recorder is able to withstand the recurrent stresses due to the dotting as it is made with the patent " Resilia " spring mounting. The case, which is circular, is of cast iron, the instrument is therefore fully magnetically shielded from the influence of magnets in neighbouring instruments, masses of iron, or cables carrying heavy currents. The moving parts are all protected behind the chart plate, there is therefore no chance of damaging them when renewing the chart. The clock is wound by the same movement that clamps the chart, and when the door is closed the whole instrument is dust-proof.

A Compact Polarimeter

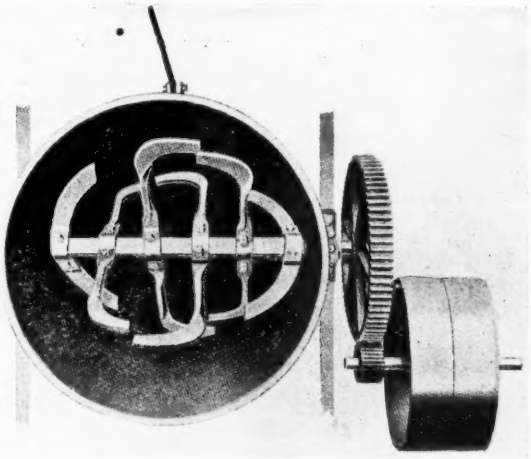
The polarimeter illustrated is one of a number of optical and general scientific instruments produced by R. and J. Beck, Ltd., 69, Mortimer Street, London, W.1. This instrument consists of a rigid frame casting that carries a cradle for the insertion of an observation tube for containing solutions. At one end is a Nicol analysing prism. This is carried in a revolving fitting which is provided with a large circle, divided in degrees, with a vernier reading to six minutes. At the other end is a

MODEL I

biquartz and a polarising prism. A lens at the eye end focuses the biquartz. The instrument is used by the comparison of tint in the two portions of the biquartz. The analyser is revolved until the tint is equal and any slight turn to the right or left changes the tint to red or blue. This method of adjustment is extremely sensitive. The tube for fluids is 200 mm. long, but tubes of shorter length are available. The whole instrument is extremely rigid and compact. The company also produces a valuable pocket microscope of reliable construction and particularly compact packing. This finds much use for examining specimens in the field.

Mixing Pans

The use of mixing pans is associated with almost every branch of industry and research and with a range of diameter varying from 6 in. to 9 ft. the Rowlandson's patent mixing pans find wide application, especially are the small sizes suited to preliminary tests and to laboratory work. The illustration shows the special design of the stirrers and it will be seen that they are at right angles to each other. This keeps the whole contents of the pan in motion and the shape of the stirrers is such that they clean the walls of the pan. Special blades are fitted to suit specific materials. The materials can be placed haphazard in the mixer and a thorough mixture, it is claimed, is obtained in a few minutes.



Another useful mixer produced by this company, W. Rowlandson and Co., 75, Mark Lane, London—is the " Unique " type, for all preparations where liquid pastes or powders are blended together and cooled in the process to prevent setting.

Pressure and Vacuum Gauges

As a result of more than thirty years' experience in designing and manufacturing recording instruments, The Bristol Co., through J. W. and C. J. Phillips, Ltd., 23, College Hill, Cannon Street, London, now offers a most complete line of recording pressure and vacuum gauges. More than 75,000 of these instruments have been sold. All ranges, from full vacuum to 12,000 lb. pressure per sq. in. can be taken care of by Bristol's recording pressure and vacuum gauges. The great variety of charts listed fit the gauges to practically every application where pressure of liquids, gases, steam, or air are required to be measured. Among other applications may be mentioned steam boiler pressure, exhaust pressure, steam pressure on heating mains, steam pressure for dry kilns, vulcanisers, pulp digesters, air compressors, pressure and vacuum in ammonia lines, natural gas pressure, gas pressure in coal gas and water gas, and by-product coke oven works, pressure of oil on step-bearings, air pressure on filter presses.

The recording gauge located where the operator can see it shows the pressure or vacuum as it is now, what it has been, and the direction in which it is leading. With such a record the attendant is able to control conditions to a high degree of efficiency. The chart records may be filed away for future reference and comparison.

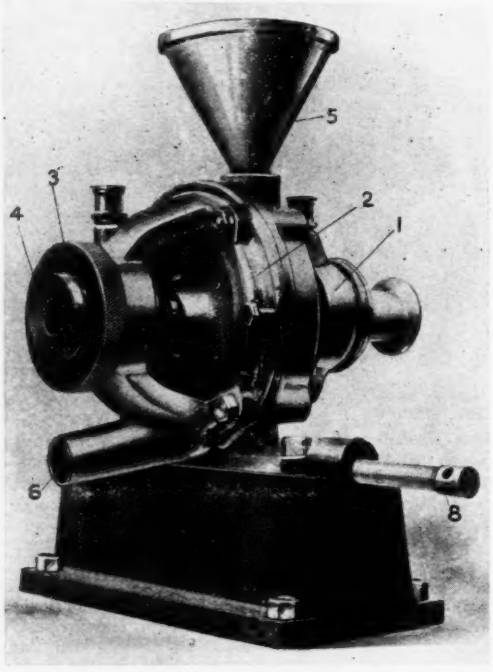
Bristol's Class III recording thermometers are operated by the expansion of a gas. Years of experience in designing and manufacturing have made these recorders thoroughly efficient and practical instruments. Mercury, because of its many disadvantages, is not utilised in any Bristol's recording thermometers. These gas-filled thermometers are made for temperature, ranging from minus 60 to plus 800° F. By means of the patented compensator, these instruments are made to operate just as accurately on the extreme low ranges, as on the higher ranges of temperature. Additional compensation is secured by properly proportioning the size of the

sensitive bulb, so as to assure a certain predetermined ratio between the volume of gas in the bulb and the volume of gas in the connecting tube, when greater lengths of tubing than 25 feet are necessary.

Colloid Mills for Laboratories

In the early stages of the inception and development of colloid mills, it seems to have been generally assumed that the disintegration or dispersion of solids would provide the chief field of usefulness. The writer's experience has been, however, that the emulsification of liquids and semi-liquids has offered a much wider scope, and it is a fairly safe presumption that other manufacturers have noticed the same tendency.

It should not be assumed that the high-speed film mill has proved in any sense a failure when used for the formation



of pseudo-colloidal dispersions, although no doubt a number of the early rather extravagant claims have not been fulfilled.

Amongst the applications in which colloid mills have secured undoubted successes must be mentioned the grinding of insoluble dyestuffs. The economy effected by mechanical treatment is very marked compared with such methods as dissolving and reprecipitating.

In the field of emulsification, the applications of film mills extend all the way from bitumen emulsions, costing a few pence a gallon, to emulsions of essential oils worth shillings an ounce. In every case, however, the cost of the actual emulsification is extremely small; experience has shown that 2s. per 1,000 gallons for power, and a total cost (apart from materials) of 10s. per 1,000 gallons is attainable.

For pharmaceutical emulsions, such as cod liver oil, the older types of homogeniser using high pressure pumps have been almost entirely superseded. The accessibility and simplicity of working parts and the ease with which cleanliness is secured in the new type of machine, apart from other advantages, is sufficient to secure its adoption. It is obvious, of course, that ordinary steel and cast iron are unsuitable as materials of construction of mills for pharmaceutical preparations, and electro-tinning of cast iron has been found to be quite useless. The difficulty is overcome by constructing the machine in such a form that the interior can be lined with a non-corrodible lining, generally Monel metal or stainless steel, and the demand for machines lined in this way is very noticeable.

The advantages of the colloid mill are gradually being recognised for laboratory work, in addition to their industrial uses.

Until recently, for example, the smallest Hurrell homogeniser sold had a capacity of about 100 gallons per hour of emulsions, and required a motor of from 5 to 10 h.p., and while quite small samples of from a few c.c's. could be treated in this machine, it was felt that something smaller was necessary for laboratory purposes. The "Model L" illustrated has been recently added to the range of sizes for this purpose, a 2 h.p. motor being sufficient for nearly all processes.

A CO_2 Thermoscope

For the thermometric analysis of carbonic acid gas in furnace and other gases, the Underfeed Stoker Co., Ltd., of Aldwych House, Aldwych, London, have produced the CO_2 Thermoscope.

When CO_2, either pure or mixed with air, is brought into contact with caustic soda a chemical reaction occurs in which heat is generated, the amount being strictly proportional to the quantity of CO_2. The thermoscope is an instrument designed to take advantage of this simple fact and consists of means for passing a known quantity of the gas mixture through pulverised caustic soda contained in a cartridge and ascertaining the amount of the resulting heat by causing the cartridge to be jacketed by a special thermometer.

The instrument consists of a cylinder fitted with a plunger for drawing the gas mixture to be analysed from the flue, etc., and subsequently passing it through a small cartridge-shaped receptacle containing granular caustic alkali, and in which the heat reaction occurs, and a special thermometer with its bulb constructed to surround or jacket the cartridge so that the heat of reaction can be imparted to the mercury, the amount of its expansion—*i.e.*, the percentage of CO_2 to be observed on a movable scale. The cylinder is fitted with a piston and cup leathers and provided with a 3-way tap at its end. The thermometer is conveniently mounted on the cylinder, and the whole is enclosed by the cylindrical jacket which is slotted to show the thermometer stem. A movable scale calibrated in percentages of CO_2 by volume is arranged to slide in the slot. The thermometer bulb is blown so as to form a cylindrical jacket in which is inserted the cartridge. This contains the caustic alkali in the form of a dry granular powder, and when about to be used the cartridge is pricked at each end, using a needle mounted in a cavity in the end of the piston rod, in order that the gas under examination may flow through. There is a rubber tube connector for delivering the gas from the cylinder to the interior of the cartridge.

In order to correct the volume of the gas drawn into the cylinder for varying room temperatures, the length of the piston stroke when taking the sample is regulated by withdrawing to a temperature scale on the piston rod, the room temperature being read for convenience on the thermometer, which is placed in a cavity of the piston rod, or by any thermometer in the room.

Swedish Vegetable Oils

The annual report of Sveriges Kemiska Industrikontor states that activity proceeded without interruption throughout the whole of the year, the raw materials treated were chiefly soya beans and copra, together with earth nuts to a lesser extent. As hitherto, the oils have for the most part been absorbed by the Swedish industries, especially the margarine and soap branches. The energetic work in the direction of an extension of the export market was continued and was crowned with success, particularly in regard to refined oils. Already in 1924 the Mediterranean countries were good customers, and sales in these markets were further increased last year. The largest addition in this respect is the district of Algeria, which has purchased a not inconsiderable quantity of oils. Moreover, exports have taken place to France, Belgium, Portugal, and Yugo-Slavia. The provender produced in connection with the extraction of the oils is gaining increased popularity both in Sweden and abroad, and exports were made to Denmark, Germany, Esthonia, and Finland. In conclusion the report refers to the production, consumption, and imports of margarine in Sweden.

The Supremacy of British Scientific Glass

Remarkable Results of Post-War Research

From time to time tributes have been published in THE CHEMICAL AGE *to the remarkable progress in the British scientific and optical glass industries. Great chemical concerns have testified to the exceptional efficiency of the British products and what survives of the predisposition towards German products is being rapidly broken down.*

To realise the true position of the British scientific glass industry to-day it is essential to recall the pre-war conditions. In a sense, the British glass industry is analogous with the dyestuffs industry. Before the war there was relatively no light or heavy furnace work, and only a very limited amount of laboratory-blown ware. After the war the Glass Research Association was formed, and functioned for five years. Then it was disbanded, and the various branches of the industry attended to their own specific needs. But the scientific glass firms continued their research, and each has its own research chemist. The whole question of British glassware is being investigated at the present time by a sub-committee of the Institute of Chemistry, but its report has yet to be laid before the full committee of that body.

It is the opinion of the leading users that British glassware is now equal, and in many cases superior, to the best pre-war German grades. Government departments have also been very satisfied with the home products. Soon after the war there was much opposition to British ware, and customers requested German goods when British were suggested. That prejudice is almost completely removed, and while complaints are occasionally made against individual pieces, these are remarkably rare, and are invariably traced to the fact that users are employing glassware for operations and processes in which glass instruments have never previously been considered.

British production is increasing, and now "the demand for British ware is very, very great," according to one prominent firm in the industry. There is one section of the market, however, that might be of much more assistance. Producers find that educational authorities, who are large buyers, will buy the cheapest possible scientific glassware. Home makers find that while their prices are not unduly high in comparison with Germany, yet the low prices of Czecho Slovakian glassware is a very real menace. The cost of labour there is exceedingly low, and is likely to continue, but British producers, whose prices have dropped slightly, are hopeful that the difference will soon be levelled still more.

Producers and users are unanimous in recording marked progress in the quality and variety of the home products since the war, and in many instances British glass is the best obtainable anywhere in the world. Thus the history of British scientific glassware represents a technical triumph, and it only needs the full realisation of its efficiency by all branches of industry to give the trade the prosperity it deserves to command.

With the object of offering concrete evidence of the supremacy of British scientific and optical glassware, we give below details of progress and products by typical British firms. But on the subject of optical glass, it is perhaps suitable, in the first place, to quote the pre-war and post-war conditions as outlined by Mr. Twyman in his presidential address to the British Optical Instrument Manufacturers' Association last year.

Optical Glass

Before the war, he said, there was one British, one German and one French maker of optical glass. Almost all the, varieties of glass made by the British maker excelled that of his competitors, kind for kind, both in transparency and in homogeneity, the two prime essentials. But twenty-six optical glasses only were listed by the British maker—an insufficient variety for the needs of the modern optical instrument-maker. That maker now lists eighty optical glasses; there are now two more British manufacturers of optical glass, so that this country is provided with three home sources of this indispensable material, all of first quality. As before the war, the British optical glass is superior to its foreign competitors in the factors of prime importance, uniformity of refractive index and transparency. Not only have the two discs for the great 41-inch telescope been made in this country since the war, but also a very fine 28-inch disc, the annealing of which is of particularly fine quality.

In 1915 the problem of annealing was taken up by one of the firms in the Association, and treated in what was then a novel way, as a problem in viscosity and in the variation of viscosity with temperature. The research was a rushed one, so much so that the complete results were never worked up into a publishable form; within a few months an apparatus was supplied to the optical glass maker, whereby the exact details of the annealing temperature could be determined in two independent ways in the space of an hour or two. Not only so, but a formula was given by the application of which the annealing was greatly accelerated; for instance, the annealing of certain pieces which had previously taken fourteen days to carry out, was thereafter achieved in three and a half days.

The name of Chance Brothers and Co., Ltd., Smethwick, Birmingham, is synonymous with British scientific glassware, and their record is a credit to British enterprise. The company were manufacturing optical glass before the war, but were not making laboratory glassware or tubing at that time. They entered the laboratory ware trade in 1921, after a long series of researches to discover what was the best practicable glass. In 1925 the company commenced the manufacture of soft soda glass tubing for the manufacture of scientific apparatus.

Their laboratory ware has been tested by the National Physical Laboratory. A report therefrom, dealing with beakers and flasks, says that after testing with hydrochloric acid (sp. gr. 1·15) none of the beakers had given up any substance to the acid; other makes had. With caustic soda, Chance Brothers' vessels were not etched; other vessels were slightly cloudy. The ware was unaffected by ammonia and ammonium chloride. The general resistance to chemical attack was good, and resistance to temperature change was satisfactory. The company claims that it is superior to any that is produced by Continental manufacturers.

Chance Brothers have manufactured optical glass continuously since 1848. In pre-war days they listed twenty-six different types, which they have now increased to about 110 types, and prices in each case are on a competitive basis.

Progress in Photographic Lenses

The importation of German and French glass as used for making photographic lenses in this country is now nearly negligible, says a pamphlet issued by the firm. Before the war, lens-makers depended largely upon the Continent for their glass supply, and because the first anastigmat lenses were made thirty odd years ago from certain glasses produced at the Jena works in Germany, Jena glass gained a reputation among photographers which it upheld for some years prior to the war. The war came, however, and it was of necessity an old English firm that was suddenly made responsible by the Government for the principal supply of optical glass, while two new makers entered the field. The output rose to something like fifty times its normal pre-war value. The properties of glass that are important to the user of a photographic lens are: Durability, or resistance to deterioration in use; transparency, that is, freedom from colour; freedom from strain and other defects. In these directions British optical manufacturers have scored a distinct triumph which has placed them ahead of all their rivals in every part of the world, while British glass of certain types is far superior.

In connection with optical glass, reference must be made also to the work of Parson's Optical Glass Co., Little Chester, Derby, who commenced manufacture of this range in 1916, and now list about eighty different types.

Durosil

Duroglass, of 40-43, Norfolk Street, London, W.C.2, is a new company started during the war at the request of the Government, because it was absolutely necessary for the country to have chemical glassware, an industry practically non-existent in this country before the war, when Germany had an almost complete monopoly.

Since the war the company has greatly improved its chemical glass, having produced what is known as "Durosil"—the consensus of opinion upon which appears to be that it is one of the best possible glasses for general use in the laboratory, being heat-resisting to a very extraordinary degree, and having regard to its other qualities, viz., resistance to acids and alkalis. The company also produces special glasses of even greater heat-resisting qualities than "Durosil," and with other qualities of a secret nature.

No optical glassware is made, but "Durosil" represents their post-war chemical glass, which is claimed to be better than any foreign product. The question of price is entirely different. These makers cannot possibly compete against Continental prices for chemical glassware, by reason of the fact that the cost of living on the Continent (particularly in Czechoslovakia) is less than in this country and other charges are less. In addition, there is the habit of manufacturers in those countries to dump their surplus productions down in our market, against which the British manufacturer has no remedy at all.

"Pyrex"

"Pyrex" glassware, now well known in all branches of chemical industry, was first made in the United States, and then the sole rights of the patents were offered under licence to France and Britain. In this country the firm of James A. Jobling and Co., Ltd., Wear Flint Glass Works, Sunderland, took up the manufacture and passed from the domestic glassware to the scientific side. It is unnecessary nowadays to point out the efficiency of this ware. Its resistance to heat is remarkable, as it does not soften below 750° C. Its ability to withstand sudden cooling may be proved by heating a "Pyrex" glass rod to 300° C., and then plunging it into cold water.

"Pyrex" is highly resistant to alkali carbonates and caustic alkalis, and is highly efficient in resistance to water, acid, ammonia, and phosphoric acid. The danger of contaminating liquids in contact with it is reduced to a minimum. Its superior strength allows rough usage. Many users claim that "Pyrex" products are equal to the world's best glass, and in many cases infinitely superior.

Glass Industry Conditions Abroad

Sweden Experiences Competition

THE annual report of the Sveriges Kemiska Industrikontor, published on April 7, states that the small glass industry has still to contend with difficult conditions of sale and specially depressed prices. The reasons for the difficult situation are partly to be found in the keen inland competition, partly in foreign rivalry, and partly in the difficulty of bringing about a necessary export trade. Besides the competition from countries with a depreciated currency Sweden has to contend with much higher wages than the other glass producing nations, the labour legislation enhancing the costs of production and sale prices. In the case of the window glass industry, Swedish makers had a further decline in the turnover last year. Large new glass works have arisen on the Continent which produce window glass by machinery at prices with which the Swedish works are unable to compete. The imports of this class, which amounted to only 1,547 tons in 1913, had increased to 4,433 tons in 1924, and further advanced to 4,749 tons last year. In this connection it is stated that a representation has been made to the Government with a view to the introduction of higher import duties. On the other hand, the glass bottle industry had a favourable business in 1925, total sales of different kinds having been 33,300,300 as against 29,300,000 in 1924 and 18,100,000 in 1913.

Czechoslovakia Depressed

The British Commercial Secretary at Prague states that the local glass industry has of late suffered from the general decline of employment. Export especially shows a marked decrease, mainly owing to the new increased Customs duties in Germany. Even in January, however, before all these new increases had entered into force, exports to Germany showed a decline of 200 wagons. Since then the situation has got worse, especially as regards hollow glass. It has been generally remarked that this branch, even in its cheaper products, is being ousted from foreign markets owing to the revival of competing industries. The decrease in orders has caused a restriction of output and many firms, it is stated, have reduced their production, and in some cases workers have been dismissed.

India's Difficulties

The Annual Administration Report of the Indian Department of Industries, United Provinces, for the year 1925 states that the Indian glass works at Firozabad making ornaments considerably extended their operations, but are still unable to compete with imports from Austria and Japan, which, being pressed in moulds, are still slightly superior in shape and appearance. The chief centre of the industry is at Nagina, where flasks and similar articles are manufactured. Small medicine and perfume bottles are also blown from white glass, the material used consisting of broken glass. There are other places in the province where this industry is carried on. The condition of the industry was stationary. The chief articles made by the factories at Naini, Bahjoi, Shikohabad and Balawali are chimneys, bottles and general scientific apparatus. The Paliwal Glass Works of Shikohabad were reorganised during the year under the guidance of a Japanese expert and started manufacturing tumblers, bottles, chimneys, etc. But this branch of the industry, like the one at Firozabad, was carried on under great difficulties and disadvantages owing to the dumping of German and Japanese manufactures and the unfavourable rates of railway freights.

A sub-committee of the Board of Industries was appointed to go into other difficulties of glass workers and to suggest ways and means of assisting the industry.

Results of the Optical Convention

"THE British optical industry, after passing through a severe crisis during the years immediately preceding and following the war, has now re-established an unquestionable superiority as regards the quality of the goods it is producing." This statement was made at the end of last week by Mr. F. Twyman, chairman of the Optical Convention. "The Convention," he said, "has had the gratifying effect of making the general public realise, as the Prime Minister pointed out in opening it, how great a necessity the optical industry is to the everyday life of the nation. Among the instruments in which British manufacturers have established a definite superiority may be mentioned camera lenses, wide-angle field-glasses, and instruments of precision.

"The progress of British optical manufacture," said Mr. Twyman, "may be attributed to three main causes: (*a*) The services of the National Physical Laboratory, which has an equipment in testing instruments better than those possessed by any other countries; (*b*) the Scientific Instrument Research Association, a body set up by optical manufacturers jointly with the Government for the purpose of improving the design of instruments and elements; and (*c*) improved optical education, provided by the Department of Technical Optics at the Imperial College of Science and by the Northampton Polytechnic."

Glass Industry and Protection

AT the House of Commons on Tuesday evening the industrial group of M.P.'s received a deputation from the glass industry of this country to urge that the flint glass industry's application for safeguarding—which was recently refused by the Board of Trade—should be reopened. Sir A. Shirley Benn presided.

Mr. Harward (Town Clerk of Stourbridge) said since 1913 nine firms, some of them old-established, had absolutely closed down, and in the same period upwards of £1,000,000 increased capital had been put into the industry, which as a result should have meant some 15,000 more employees. In 1913 nineteen firms employed 3,600 men, and to-day there are twenty-two firms employing 4,400 men. Questioned by members, Mr. Harward said that that did not mean better trade, because many of these men were packers and others who were engaged in packing or handling imported goods. Their case was that, instead of 4,000 men, the industry could employ 14,000.

It was decided that employers and workpeople should supply a fresh statement of conditions to be shown to the President of the Board of Trade.

The visit was preceded by a meeting at Caxton Hall, when a resolution was passed asking for a fresh consideration of the application for safeguarding.

Society of Dyers and Colourists

Annual Meeting of Manchester Section

THE annual general meeting of the Manchester Section of the Society of Dyers and Colourists was held on Friday, April 16, Mr. L. Guy Radcliffe presiding.

The report for the year ending December 31, 1925, showed a rise in membership from 389 to 410. Messrs. Holden, Huebner, Radcliffe and Rowe were elected members of committee, and Mr. N. Chappell was appointed Hon. Secretary of the section.

An ordinary general meeting of the section was then held.

A paper entitled: "A New Reaction of Certain Diazosulphonates Derived from β-Naphthol-1-sulphonic Acid, Leading to the Preparation of Phthalazine, Phthalazone and Phthalimidine Derivatives," by F. M. Rowe, Esther Levin, A. C. Burns, J. S. H. Davies and W. Tepper, was read by Dr. Rowe. He stated that the compounds formed by the action of sodium carbonate or one molecular proportion of sodium hydroxide on diazosulphonates derived from β-naphthol-1-sulphonic acid, had been regarded hitherto as diazo-oxides, but in view of a new reaction of certain of these compounds with an excess of sodium hydroxide they appeared to be actually sodium-aryl-1-azo-β-naphthaquinone-1-sulphonates. All compounds of this type were converted quantitatively by cold dilute acids into the corresponding azo-derivative of β-naphthol, but only those derived from diazotised amino-compounds containing a nitro or an azo group were sufficiently stable to react further with sodium hydroxide in the new way without decomposition. Further, β-naphthol-1-sulphonic acid stood alone in the latter respect.

Reaction of Diazosulphonates

Principal attention had been devoted to the elucidation of the reaction which occurred with 4′-nitrobenzene-2-naphthol-1-diazosulphonate. When a solution of this in aqueous sodium carbonate was added to an excess of cold aqueous sodium hydroxide the temperature rose and a crimson colour developed immediately, which changed slowly to orange brown. Subsequent acidification gave only traces of Para Red, and a yellow compound with the properties of an acid dye could be isolated in excellent yield. It was considered that sodium 4′-nitrobenzene-1-azo-β-naphthaquinone-1-sulphonate was formed by the action of sodium carbonate, and that the ring opened by the addition of NaOH to this, forming an intermediate carboxylic acid, which, by rearrangement and closing of the ring, gave disodium-3(4′-nitrophenyl)-1:3-dihydrophthalazine-4-acetate-1-sulphonate. When this was boiled with dilute mineral acid one molecular proportion of sulphur dioxide was evolved and 1-hydroxy-3-(4′-nitrophenyl)-1:3-dihydrophthalazine-4-acetic acid was formed, of which esters, acetate, and anilide had been prepared. Reduction of this acid with alkaline hydrosulphite gave 1-hydroxy-3-(4′-aminophenyl)-tetrahydrophthalazine-4-acetic acid, which was converted by prolonged boiling with mineral acids into 4′-amino-3-phenylphthalaz-4-one. The latter was reduced by zinc dust and hydrochloric acid with elimination of ammonia to 4′-amino-*N*-phenylphthalimidine, from which the known *N*-phenylphthalimidine was prepared.

Dr. Rowe read a paper entitled: "The 'Blinding' of Viscose Dyed with Insoluble Azo Colours." The author said that the application of azo compounds in dyeing artificial silks by processes of diazotisation and development on the fibre had a definite limitation, because, in many cases, full shades were particularly liable to "blind" the fibre, that is, render it non-lustrous. This was due to the production in the fibre of a supersaturated solution of the colouring matter, which then crystallised almost completely, leaving a virtually colourless fibre, in which large aggregates of colouring matter were distributed and so masked the lustre.

In the case of viscose, the use of the commercial so-called naphthols with diazotised bases might lead to "blinding" in another way. Thus, combinations which produced a satisfactory result when finished with soap and soda at 60° C., might cause "blinding" when finished in a boiling soap bath. This also was due to the fact that the true solution of the colouring matter in viscose was coagulated at the higher temperature, with the result that crystalline aggregates were disseminated throughout the fibre. Actually, the 'blinded" fibres had lost none of their lustre, but this was merely masked by the solidified colouring matter. The tendency to cause "blinding" was not a function of either the diazotised base or the naphthol, but of the azo compound itself. A number of hanks of viscose dyed with azo combinations, in which little or no difference between the appearance of the fibre finished at 60° C. and 90° C. could be detected with the naked eye, were exhibited. The improvement in these cases suggested that colour makers might well turn their attention to the manufacture of insoluble azo combinations specifically to avoid "blinding" on viscose.

Artificial Silk Exhibition

Successful First British Venture

SCHOOLDAY memories include the injunction of the art class to half-close the eyes in order to gain a truer perspective of colour and shadow. To do this at the Artificial Silk Exhibition this week was to give cause for wondering whether science is not outrivalling nature. Indeed, on several stands where flowers were called in for decoration, their colours almost lost by comparison with the rainbow of fabrics around.

Such then is the progress, not only of that essentially chemical triumph, artificial silk, but of British dyes. With the finished products we are not so much concerned, save that the presence of artificial silk carpets is indicative of the growing possibilities of this product.

Of the exhibitors mention must be made of the Bradford Dyers Association, pioneers in the dyeing and finishing of fabrics containing artificial silk, and British Celanese, Ltd., whose products now include men's wear. Brunner Mond and Co., Ltd., The Castner Kellner Alkali Co., and Chance and Hunt, Ltd., showed a wide range of chemicals, including: soda ash; caustic soda; bicarbonate of soda; hydrochloric acid, including the pure synthetic product; sulphuric acid; sodium sulphide; sodium sulphate; chlorine and chlorine compounds; bleaching powder; sodium hypochlorite; sulphur di-chloride; sulphuryl chloride; acetone; amyl acetate; also white synthetic sulphate of ammonia manufactured by Synthetic Ammonia and Nitrates, Ltd. Messrs. The Buxton Lime Firms Co., Ltd., also exhibited their specially prepared hydrated lime.

The Bulmer Rayon Co., Ltd., showed yarns by the Collodion and viscose processes, and Lever Bros., Ltd., demonstrated suitable washing methods for artificial silk, and Morton Sundour Fabrics, Ltd., so ably connected with colour research and application, had a prominent stand. Western Viscose Silk Mills, Ltd., demonstrated various stages in the manufacture of "Wescosyl" yarns.

A B.D.C. Triumph

But, from the chemical view-point, the Exhibition, housed at Holland Park Hall, includes one outstanding feature. We refer to the stand of the B.D.C. At long last we have an exhibit that conveys instruction to the lay public—an intensely attractive and therefore instructive piece of propaganda.

The front of the stand is crowned by a great lump of coal, and in four directions from it different dye colours are shown flowing continuously. The public seldom realises how vast is the quantity of chemicals required to produce the smallest quantity of dye. This fact is impressed at the B.D.C. stand by a group of model trains consisting of numerous trucks, and each railed so as to converge to a point. Each train and truck is complete in every detail, and the trucks all carry the chemicals necessary to produce the small glass bottle of Chlorazol Black E Extra which stands at the junction of the several lines. The actual chemicals are shown, all packed as they would be in actual commerce—the carboys and drums, the bags and the flasks. Each constituent is labelled, and the quantity of it required is indicated. Then, further to stress the marvels of science the tiny bottle of black is backed by a very large piece of viscose silk—the actual quantity that is dyed by the amount of dye shown. A dye machine s shown in operation, and several other pieces of plant are demonstrated against a background of brilliant fabrics.

It is many many months since we have been able to describe such an effective exhibit in contrast to the monotonous stands that convey absolutely nothing to the lay public. Whoever is responsible for the exhibit merits congratulation—the effects were seen in the number of interested onlookers.

Oxygen Production from the Air

Recent British Advances

DEVELOPMENTS by the British Oxygen Co., Ltd., in the direction of producing oxygen from the air, following the demand for the purest gas for metal cutting and welding purposes, were described in a paper read before the British Acetylene and Welding Association on Wednesday, April 14, by Mr. C. R. HOUSEMAN (chief chemist to the company).

Three years ago, he said, the company carried out cutting experiments on 2 in. steel plates, with oxygen of 98·5 and 99 per cent. purity, and found that even the small difference of 0·5 per cent. in the purity made an appreciable difference. These conclusions had been amply confirmed and extended by the Air Reduction Co., of U.S.A., who tested qualities of oxygen ranging from 97·5 to 99·5 per cent. on a large variety of steel plates. As the oxygen quality diminished, the pressure had to be increased, and this meant a proportionate increase in the quantity used, a longer time for cutting, and a relatively inferior quality of cut. The lower the pressure at which oxygen cutting was effected, the cleaner and better the cut, and low quality oxygen generally revealed itself by the roughness of the lower section of the kerf and a fringe of partly burned metal on the lower edge.

Accumulation of Impurity

There was nothing mysterious about this effect. Since argon was not removed from the gaseous phase by chemical combination, its proportion must increase progressively as the cutting jet descended the kerf, oxygen being rapidly removed with iron as molten oxide. Argon was the impurity present in oxygen obtained by the liquefaction of air. Gas of 98 per cent. quality contained practically no nitrogen, and at 96 per cent. there was still very little. With electrolytic oxygen the impurity was hydrogen, and this likewise remained in the gaseous phase at the temperatures involved, either as unchanged hydrogen or as an equal volume of steam. Whether argon or hydrogen, the diluting effect was much the same. It was because of this cumulative diluting effect that relatively small percentages of impurity in oxygen, which would be entirely negligible in oxy-acetylene welding, were detrimental in cutting. An excess of oxygen was required in the jet to maintain sufficient oxygen concentration at the bottom of the kerf for completion of the cutting, or to minimise the cutting lag towards the under side of the cut.

It had never been possible economically to produce oxygen of greater purity than 98·5 per cent. by the type of bubbling plate or perforated gauze hitherto employed in the company's rectification plant. The extraction of oxygen from the air by the liquefaction process resulted from the rectification of a liquid oxygen-argon-nitrogen mixture. The modern double column type of separator consisted of two rectification columns, one above the other, the lower working under a pressure of 4 to 5 atmospheres, and the upper at a little above atmospheric pressure. The air to be separated, after having been cooled by the cold gas leaving the plant, was fed into the lower column, and passed upwards through plates to a nest of tubes which were immersed in liquid oxygen. Here, when the plant was running normally, partial liquefaction took place, and the liquid formed fell back over the plates with a scrubbing effect on the rising vapours. Practically the whole of the oxygen was thereby carried to the bottom of the lower column, from which, as a liquid containing about 50 per cent. of oxygen, it was passed to the requisite level in the upper column.

The Counter Current Principle

The gas, practically pure nitrogen, which was not liquefied in the inner tube of the nest referred to, passed over to be condensed in the outer tubes thereof, so producing a washing liquid to be introduced at the top of the upper column, in which the final rectification took place. The liquefaction inside these tubes was accompanied by evaporation of the surrounding liquid oxygen, and thus originated the counter current of gas and liquid in the upper column. The upper part of such a column, when normally in action, was occupied mostly by the nitrogen and the lower part by the less volatile oxygen. On the lower plates, owing to the close proximity of their boiling points, nearly pure oxygen was associated mostly with argon, and the gas and liquid there passing in counter current approximated very closely in composition and temperature. For this reason the intimacy of contact between the gas and liquid on these plates was of great importance.

To this end, therefore, after prolonged experiments, the British Oxygen Co. had adopted a type of rectification plate which ensured a far more intimate mingling of the gas and liquid than had hitherto been obtained. Its efficiency was essentially due to its capacity to produce a foam or froth, and this resulted from the employment in its construction of a closely wound copper ribbon arranged to give a multitude of passages so minute that the molecular forces for any particular liquid became highly operative, so that the plate acted practically as a sponge, capable of retaining the liquid within the passages when the pressure above and below was substantially the same. If these passages were too large, liquid was not retained, and it was not possible to produce the desired foaming effect. If they were too small, the pressure required to force the gas through became objectionably great. To obtain the frothing or foaming effect, there must be sufficient capillary action in each of the multitude of small passages. A finely perforated metal sheet or wire gauze failed in this respect.

Action of Foam Plate

The great capillary action of the foam plate, however, made it function in quite a different manner. The liquid was held most tenaciously between the ribbons of which the plate was constructed, in the capillary passages, and before the gas could pass through, it had to force out the small column of liquid contained therein. A small bubble was thus formed, which broke away at the top of the capillary, and the liquid was immediately sucked back. Then another small bubble rose, and was similarly immediately cut off, and so on. The unbroken column of gas became a succession of small bubbles rising from the myriad capillaries. These small bubbles coalesced as they rose through the liquid, and hence the foam became gradually coarser as the distance from the plate increased. In the construction of the new plate, plain and corrugated thin copper ribbons of suitable width were caused to alternate in spiral winding. The number of minute but relatively deep passages obtained per square inch of effective surface of plate was approximately 10,000.

No liquid passed downwards through the plate via the capillary spaces. The passage of all liquid after foaming was effected by special sealing devices, which also prevented trouble arising should solid impurities be present in the liquid. Liquid leaving one plate was fed on to the outer extremities of the next lower plate by a distributing pipe. It travelled radially, and during its passage to the central overflow on the plate was converted into a foam. The foam condensed in the central liquid sealing device, through which gas could not pass, and the liquid formed was delivered to the next lower plate. A very important feature of the plate was the small back pressure offered by it to the passage of gas. The passage of 30 c. ft. of gas per sq. in. of sectional area per hour resulted in a counter pressure of only two or three inches of water.

Purer Oxygen Produced

By introducing these plates into the rectification columns of the existing plants, the company were easily obtaining oxygen of 99·5 per cent. purity, and in larger quantity than when the purity was 98·5 per cent. Before the end of this year they hoped to be able to guarantee a uniform standard quality of a least 99·5 per cent. at all their oxygen factories. Also, they believed that they would be able shortly to supply still purer oxygen. The troublesome impurity was argon. There was 0·93 per cent. by volume in the air treated. If, with these highly efficient plates, and other modifications, the argon could effectively be removed from the liquid air in the course of rectification, it would become possible to produce oxygen and nitrogen simultaneously from the same plant, each in a state of very nearly 100 per cent. purity, and almost in theoretical yield. The results so far obtained were very favourable.

Discussion

Mr. K. S. MURRAY (British Oxygen Co., Ltd.) said that the paper described for the first time what the company believed to be a very important development in the direction of separating simultaneously oxygen, nitrogen, and argon from the atmosphere in practically the same apparatus, and that was the goal which all workers on this subject had aimed at ever since the process for the production of liquid air was invented. That process had been developed so far in three important stages. First, in 1895, the nozzle expansion and self-intensified cooling method for the production of liquid air was described almost simultaneously—in Germany by Professor Linde and in this country by Dr. Hampson, who at that time was associated with the British Oxygen Co. In 1902 came Linde's great invention of simple rectification, which solved the problem of the commercial separation of oxygen from the atmosphere, although it had the defect of leaving more than one-third of the oxygen still in the atmosphere. Then in 1905 or 1906, Claude proposed the double system of rectification, by means of which more oxygen was abstracted from the atmosphere. The fourth stage had been described for the first time by Mr. Houseman. He could remember the day when oxygen sold at 6d. per c. ft., and it was not so very long ago that the company were selling it at an average price of £3 per 1,000 c. ft. Thanks to the economies effected in production, and to the increase in output, the company were to-day selling at half that price, and at a better profit than they earned when they sold at £3 per 1,000 c. ft. Less than three years ago, at the annual shareholders' meeting, he stated that within two years the company had reduced the average price of oxygen in cylinders by 20·65 per cent., in spite of which fact the gross profits on the sales showed an appreciable increase. To-day the oxygen-producing industry in this country had nothing to learn from Germany, or any other country.

Prices

Mr. C. S. MILNE said that the British Oxygen Co. was to be congratulated, because he believed the only commodity in this country which had not risen in price during or since the war was oxygen. They had had just as much opportunity as anybody else, had they been grasping, to increase the price, regardless of the fact that increased output had enabled them still to make some profit without doing so.

The PRESIDENT (Mr. H. E. Baker) also congratulated the company upon the manner in which they conducted what was more or less a monopoly. They charged a fair price, and, as they made improvements, they gave their customers the benefit of them.

Mr. A. G. C. LUCAS asked for more information as to the effects produced by oxygen of different degrees of purity, not only in metal cutting, but also in welding.

Mr. W. C. FREEMAN asked if there had been produced, or was likely to be produced, oxygen with a degree of purity higher than 99·5 per cent.

Mr. HOUSEMAN replied that, so far as he was aware, it was not possible to produce oxygen nowadays of a purity higher than 99·5 per cent. in anything like an economic yield, although the company had hopes of obtaining a higher purity in the future, without allowing the yield to suffer. He was unable to give information as to the influence of impurities in acetylene on metal cutting or welding, but with regard to the influence of impurities in oxygen, in the case of oxy-acetylene welding the 1 or 2 per cent. of argon which was likely to be present could make very little difference to the welding operation.

Pulverised Fuel Developments

INTERNATIONAL COMBUSTION, LTD., announce that since the beginning of the year there has been a great demand for their British manufactured "Lopulco" products, as will be seen from the following orders: North Metropolitan Electric Supply, steam generating and "Lopulco" combustion equipment. South African Electricity Commission, appointed main contractors for the new super power station at Congella, Durban; order covers all steam generating equipment and "Lopulco" combustion apparatus, etc. Compagnie Espagno Americano (Buenos Ayres), "Lopulco" combustion equipment for the large super power station. Shell Mex, Ltd., complete contract for new power house, including steam raising and "Lopulco" combustion equipment.

Chemical Matters in Parliament

Government Research Departments

Lord Eustace Percy (House of Commons, April 13), in reply to Sir F. Sykes, said that the Department of Scientific and Industrial Research had facilities for preventing duplication of research and assisted the collation of effort. The Department had no executive control over research in other departments. Where possible the Department took active steps to bring to the notice of interested Government Departments the results of research carried out by industrial and scientific organisations; from time to time it arranged for co-operation between such organisations and Government Departments in the investigation of important problems of mutual interest.

B.D.C. Shares

Mr. Churchill (House of Commons, April 15), in reply to Mr. Townend, said that the sum of £600,000 had been received from the British Dyestuffs Corporation in compensation for the Government shares in that corporation which have been cancelled and paid into the Exchequer as Miscellaneous Revenue in accordance with the law.

Sugar Beet Subsidies

Mr. McNeill (House of Commons, April 15), in reply to Mr. Duckworth, said that the State did not make advances under the Trade Facilities Scheme; its assistance was given in the form of guarantees in respect of loans raised for capital expenditure. The guarantees which the Treasury had expressed its willingness to give in connection with sugar beet to March 31, 1926, were:—Anglo-Scottish Beet Sugar Corporation, Ltd., £370,000; West Midland Sugar Co., Ltd., £150,000; Orchard Sugar Co., Ltd., £80,000; Second Anglo-Scottish Beet Sugar Corporation, Ltd., £865,000; Central Sugar Co., Ltd., £185,000. Total, £1,650,000.

Artificial Silk

Mr. Churchill (House of Commons, April 15) said that the approximate figures of net revenue collected during the year ended March 31, 1926, included:—Duties on silk and artificial silk, £3,192,000. This figure included £601,000 on account of the Excise Duty on artificial silk. The Safeguarding Duties comprised the duties imposed under the Safeguarding of Industries Act, 1921, the Finance Act, 1925, Section 6, and the Safeguarding of Industries (Customs Duties) Act, 1925.

Sir P. Cunliffe-Lister said that since July 1, 1925, 12 companies with an issued capital of about 3 million sterling, had been registered to manufacture artificial silk primarily. Ten had started, 5 experimentally and five were producing. He could not say the numbers employed and asked for notice of a query as to whether one of 6 expected to start shortly was to take a site in Dumbartonshire.

Sir P. Cunliffe-Lister (House of Commons, April 20), in reply to Sir H. Croft, said that the declared values of the exports of artificial silk manufactures (except apparel and embroidery) from the United Kingdom during the first quarters of 1926 and of 1925 were £1,357,489 and £742,178, respectively. The total for 1926 thus exceeded that for 1925 by 82·9 per cent.

Boiler Feed Water for High Pressure Work

A SATISFACTORY and economical answer to the complete conditioning of boiler feed water for high pressure operation is outlined as follows in Serial 2727, recently issued by the U.S.A. Bureau of Mines, Department of Commerce:—

"If the make-up water is evaporated and the only impure water entering the boiler consists of the condenser leakage, then the conditioning of the boiler water with phosphate is the only chemical control necessary. If the make-up water is not evaporated and is of some magnitude, then economy demands the pre-treatment—with lime and soda ash for any water or by a base exchange process if the water is not high in temporary hardness—followed by the final conditioning of the boiler water with phosphate. In the pre-treatment, however, any addition whatever of excess chemical must be avoided or detrimental concentrations of caustic alkalinity will develop in the boiler water. If it is deemed desirable to limit the amount of soluble solids in the boiler water and the feed water is one that contains sulphate, a variation in pre-treatment may be made by using barium carbonate in place of sodium carbonate, thus removing much of the sulphate as well as the calcium. In any event, however, the final control of the boiler water must be based on the use of a suitable substance such as phosphate."

From Week to Week

MR. F. CARNEGIE, Chief Mechanical Engineer, Woolwich Arsenal, is to be Chief Superintendent of Ordnance Factories.

A COMPLETE "FOAMITE" INSTALLATION for the protection of her boiler rooms has been fitted on G.T.S. *Maid of Orleans*.

ON APRIL 29 at 5.15 p.m. at the Royal Institution, Sir William Bragg begins a course of three lectures on "The Imperfect Crystallisation of Common Things."

PROFESSOR W. E. S. TURNER will deliver an informal lecture before the Chemical Society on April 29 at 6 p.m. on "The Additive Relationships in the Properties of Glasses."

THE RENEWAL OF THE KEY INDUSTRIES DUTIES is anticipated in reliable quarters as one of the provisions of this year's Budget. These duties of course include a wide range of fine chemicals, optical glass, scientific glassware, etc.

H. METZ states that he has completed final arrangements whereby his corporation will handle exclusively all I.G. dyestuffs in the United States. He further states that this concentration will cut down the present colour lists and reduce prices, and that with closer collaboration among German firms, he feels that it will be only a matter of time when dye imports from America will have ceased entirely. He states that German dyestuff firms are dumping bulk colours all over the world, including Germany, although there is no similar dumping in the United States.

A MEETING OF THE CREDITORS of the Bedford Chemical Co. (1922), Ltd., Bedford, in voluntary liquidation, was held recently at St. Peters Street, Bedford. The chair was occupied by Mr. E. Lucas, Bedford, who reported that the company had passed the usual resolution for voluntary liquidation, and had appointed him to act as liquidator. He added that the ranking liabilities of the company were £6,853, against net assets of £1,272, or a deficiency of £5,581. A resolution was passed confirming the voluntary liquidation with Mr. Lucas as liquidator.

A PRESENTATION is to be made to Professor T. Turner, who, as already announced in THE CHEMICAL AGE, retires from the chair of Metallurgy at Birmingham University at the end of the present session. Professor Turner's connection with the University extends to nearly forty years. The form of the presentation is not yet decided but a small portion of the fund will be set aside for the provision of a framed photograph of the Professor, to be placed in the Department. Subscriptions should be sent to Mr. W. L. Kent, The University, Edgbaston, Birmingham, and suggestions for the proposed testimonial are invited from subscribers.

DURING MARCH UNEMPLOYED INSURED WORKERS in the chemical etc., industries totalled 7,736—6,794 men and 942 women. This represents 8 per cent. of workers and is a slight decrease on the previous month.—Diseases of occupation recorded during the month included 28 cases of lead poisoning (two fatal), two cases of mercurial poisoning (one fatal), and three of aniline poisoning. There were 14 cases of epitheliomatous ulceration (two fatal) and four cases of chrome ulceration. There were 8 cases of lead poisoning among painters and plumbers (two fatal).—There were 6 fatal accidents in the chemical industry during March.

THE CERAMIC SOCIETY, Refractory Materials Section, will hold a meeting in Cornwall on May 6 and 7, when Mr. Frank West, President of the Society, will be chairman. On May 6 papers will be read and a general meeting will be held at the Atlantic Hotel, Newquay. On May 7 members will inspect the China Clay properties including the Caudledown China Clay mine, as guests of H. D. Pochin and Co., Ltd. This company's Ball Clay mines at Newton Abbot will also be visited. Immediate notification by those wishing to be present is asked for by the Secretary, Dr. J. W. Mellor, Central School of Science and Technology, Stoke-on-Trent.

THE WORK OF THE IMPERIAL INSTITUTE was the subject of a paper read before the Royal Society of Arts on Friday, April 16, by Sir W. T. Furse, director of the Institute. He outlined the history of its foundation and surveyed the research work of to-day. He pointed out that the great reference library of mineral and metallurgical subjects was open free of charge to the public and covered all colonies and the latest statistics. He hoped that the exhibition galleries would be open to the public again by Whitsun and instead of the rows of bottles and scientific exhibits, the displays would be on more attractive and instructive lines. A cinema was contemplated for education films.

SULPHURIC ACID is now manufactured in Argentina in five establishments at the rate of approximately 24,000 metric tons annually, according to the latest report. This includes plant operated by the Sanitation Department of the Government, which at present produces about 650 tons of sulphuric acid per month. Imports of sulphuric acid have declined sharply during the past few years. The 1923 receipts were reported at 5,775 metric tons, while those for 1925 are not expected to exceed 150 tons. Local manufacture of sulphuric acid is due to the high freight rates, insurance, and import duties. The sulphur used is imported principally from the United States, Italy, and Chile.

THE UNITED ALKALI CO., LTD., will be prominent exhibitors at Widnes Trade Exhibition to be held from May 5 to 11.

SIR HUGH BELL, director of Brunner Mond and Co., and this year's recipient of the Bessemer Medal, has been in Italy this week.

J. GILL AND SONS, bleachers, of Menston-in-Wharfedale, have purchased premises for a factory at Selby, near to the Aire and Calder canal.

CARLESS, CAPEL AND LEONARD, Hope Chemical Works, Hackney Wick, announce that Mr. J. C. Leonard and Mr. J. M. Leonard have been admitted as partners.

PROFESSOR CHARLES FARBY, Professor of Physics at the Sorbonne, Paris, was to deliver the eleventh Guthrie Lecture of the Physical Society of London on Friday, his subject being "The Absorption of Radiation by the Upper Atmosphere."

IN AN ACTION by the King's Lynn Milling Co. against the Synthetic Products Co., Ltd., Mr. Gordon Brown applied to Mr. Justice Romer in the Chancery Division on behalf of the plaintiffs for the appointment of a receiver. He said that the plaintiffs were the holders of debentures upon which about £8,000 was due. The works, he said, were closed down. His lordship appointed a named person as receiver subject to the production of a proper affidavit of fitness.

THAT CELLULOID could be kept in store to any amount without a licence provided it was not for sale, hire, or profit, was confirmed at a meeting of the City Corporation in London last week. Mr. J. S. Pearse, chairman of the County Purposes Committee, said that his committee was of opinion that this provision of the Act governing the sale of celluloid in the City might give rise to considerable danger and endeavours would be made to procure an amendment in the law in that respect.

APPLICATIONS ARE INVITED for a limited number of Fellowships available for chemists of post-graduate standing who are desirous of adopting a career in industrial chemistry. The value of a Fellowship is normally from £250 to £300, but the Salters' Institute is prepared to consider applications which might justify the award of a Fellowship of higher value. Applications should be received by the Director of the Institute, Salters' Hall, St. Swithin's Lane, London, E.C.4, on or before June 1.

TWO APPOINTMENTS of interest in this country have recently been announced by Prescott and Co., Montreal. Mr. Jack Margolis, graduate of Manchester University and latterly of the British Dyestuffs Corporation, has joined the sales staff and will attend to the Quebec territory and to the Eastern District of Ontario. Mr. Kenneth A. Dixon, graduate of the Technical College, Bradford, and latterly with the Sandoz Chemical Works, will devote his time to other areas in the Ontario district. Prescott and Co., Reg., are agents for the Saint-Denis Dyestuff Co., Ltd., of Paris.

MR. PHILIP SNOWDEN, M.P., speaking at Bromley last week, said that we were to-day in a position very much like the industrial revolution which took place about 120 years ago, when the steam age was ushered in. Now we were entering on the new age of electricity and industrial chemistry, and wideawake capitalists were taking steps to appropriate for private profit and private ownership the exploitation of these great forces. It was most important that every new invention and discovery should become the property of the community.

FURTHER DETAILS are now available of the International Oil, Chemical, and Colour Trades Exhibition of June 11 to June 18, 1927, referred to last week. Oils, chemicals and chemical plant, paints and colours, soaps, etc., will be specially catered for and there will be arrangements for conferences or lectures to be held during the exhibition. The organisers are the International Trade Exhibitions, Ltd., who have been responsible for over 100 exhibitions, and they will be assisted by an advisory committee of the trade and exhibitors. The public are to be admitted at a charge of one shilling, exhibitors being provided with free tickets to the face value of the full amount of their space rental. The Exhibition will be widely advertised and tariffs are now available at the Exhibition Offices, Broad Street House, Old Broad Street, E.C.2.

RECENT CHEMICAL TENDERS accepted include:—J. Parker, Salford, colza oil; United Alkali Co., Ltd., nitric acid, spirits of salts, and sulphuric acid; Brunner, Mond and Co., caustic soda; Smith and Forrest, turpentine; A. McNair and Co., Ltd., orange shellac and white lac; Baxendale and Co., Ltd., methylated spirits; Griffiths Brothers (London), Ltd., insulation varnish and compound—all for Manchester Tramway Committee. Buxton Lime Firms Co., Ltd., lime, for sewage precipitation; disinfectants, Sanitas Co., Ltd., and Burt, Boulton and Haywood, for East Ham T.C. T. Soulsby, filter, £608 (recommended), for Manchester R.D.C. E. H. Bampton, Ltd., Ormskirk, two percolating filters, etc., for West Lancashire R.D.C., £1,535 11s. 7d. P. Spence and Sons, Ltd., Manchester Alum Works, Manchester, 10 tons commercial aluminoferric and 10 tons refined aluminoferric, for Alfreton U.D.C. W. C. Holmes and Co., Ltd., Huddersfield, semi-direct ammonia recovery plant, Partington; J. M. Horrocks, conveyance of ammoniacal liquor; United Alkali Co., Ltd., soda ash—all for Manchester Gas Committee.

A MERGER is announced between the Mathieson Alkali Works, New York, and the Fields Point Co., Providence, R.I.

IMPORTANT ADDITIONS are to be made to the already extensive factory of Scottish Dyes, Ltd., Grangemouth. The Guild Court has granted a warrant for the provision of a chemical house estimated to cost £8,000 and a large mess room near. The new building is planned to be 150 ft. by 60 ft.

AN INQUIRY into the death of a New York leather worker is reported to have shown the cause to be inhalation of the fumes of potassium cyanide, and the authorities are asking for its prohibition as a fumigant. The medical examiner is understood to have recommended the substitution of sulphur dioxide as this would serve the same purpose and would be easily and quickly detected.

MAJOR C. A. MANDER, of Shifnal, Salop, at Stafford last week accepted office as High Sheriff of Staffordshire. He is one of four managing directors of the firm of Mander Brothers, Ltd., varnish, paint, and printing ink manufacturers, of Wolverhampton; and eldest son of Sir C. T. Mander, head of the firm. Major Mander is chairman of the Midland Section of the National Federation of Paint, Varnish, and Colour Manufacturers.

A STANDARDISATION OF COMMERCIAL PACKINGS for chemical insecticides, etc., is reported by the U.S. Department of Commerce, and the organisations of the industry have agreed that it shall become effective on May 1. The scheme includes the elimination of a number of packages and recognises only the following:—Arsenate of lead, calcium arsenate, and Bordeaux mixture in packages of 100, 25, 5, 4, and 1 lb. sizes; Paris green (whether or not sold under that name) in kegs of 250 to 300 lb., and packages of 100, 14, 5, 1, and ½ lb. sizes. These sizes are to be considered a standard list, while any packages not listed will be supplied as special goods.

AT THE INVITATION of Sir Robert Robertson, Government Chemist, the London Section of the Institute of Chemistry visited the Government Laboratory, Clement's Inn Passage, London, W.C., on Wednesday. The visitors were shown over the departments of the laboratory and various aspects of the work done and the methods used were described by members of the laboratory staff. Among others, there were interesting accounts of tests and analyses carried out in connection with the Food and Drugs Acts, the examination of spirits, wines, beers and tobacco, the Safeguarding of Industries Act, etc. There was a very large attendance. Sir Robert Robertson received the visitors.

THE NAMES OF SIR ALFRED MOND and Mr. Henry Mond are associated with plans for a co-operative selling system for British coal. Sir Alfred is understood to have had conversations with the two representatives of the great selling organisation of the Westphalian coal fields who have been visiting the country this week, and a conference of leading coal magnates of Europe is expected to take place shortly in London at the instigation of Sir Alfred Mond. He has urged the desirability of investigating the methods of the German syndicate with a view to eliminating unsound price reductions and replacing such steps by co-operative selling, especially in regard to export trade.

UNIVERSITY INTELLIGENCE includes the following announcements:—*Florida*: The State of Florida has now appropriated $220,000 for the erection of the first unit of a new chemistry building at the University, to cost $1,000,000. The Chemistry Department has already six professors and instructors, but of 1,484 students, 652 are taking chemistry. *Harvard.*—From the Milton Fund a grant of $60,000 for special research work is reported. These include grants to Associate Professors J. B. Conant, G. S. Forbes, Grinnel Jones, and A. B. Lamb, for specific research, including a study of the irreversible oxidation of organic compounds, photochemical investigations, electrical conductivity of solutions, and the absorbent qualities of certain crystalline substances. *Reading.*—Huntley and Palmer have promised a donation of £10,000 for endowing research in agriculture.

THE RELATION OF SCIENCE TO INDUSTRY was dealt with at the annual luncheon given by the Council of the British Non-Ferrous Metals Association at Birmingham on Tuesday. Mr. T. Bolton, chairman of the Association, paid tribute to Professor T. Turner's work and said that he felt sure the Association's connections would continue happily under his successor, Dr. Hansen. The value of scientific men in industry had increased very rapidly in recent years, and he had heard it said there was a prejudice against university men. If any such prejudice existed it was due to the impression—probably without foundation—that the university man fancied that if he spent one or two holidays at a works he became one who could at once take an important job in a factory. He would first choose one who had had similar experience in another works, or promote one of his own juniors. If neither of those courses was open he would engage a man from the university; but he would not ask him to take over full responsibilities until he had served some time at the works. His advice to a university student was to devote all his time to scientific work and not worry about the works training until he went there. Speakers appealed for simpler language in the reports of research workers, and a suggestion was made that the Association might be forced to extend their central laboratories which had been started under Dr. Hutton.

OWING TO A PRINTER'S ERROR the advertisement of the Paterson Engineering Co., Ltd., last week, contained the name incorrectly spelt as "Patterson."

FESCOL, LTD., inform us that all communications, etc., should now be sent to their new works at 101, Grosvenor Road, Westminster, S.W.1. (Telephones, Victoria 2622/3.)

SMOKE NUISANCE fines imposed at Manchester on Wednesday included: H. Cochrane and Son, Ltd., dyers, Bower Street, Newton Heath, 40s.; C. J. Schofield, Ltd., chemical manufacturers, Ashton New Road, Clayton, 20s.; Manchester and Sheffield Tar Works Co., Ltd., Croft Street, Clayton, 20s.

MR. JOHN EMSLEY, of Bradford, speaking as retiring president of the Textile Institute at Manchester on Wednesday, referred to the great importance of the Charter enabling the Institute to confer degrees in science. He contended that the salvation of our industries depended upon science. Mr. W. Haworth, Bolton, managing director of the Fine Spinners' and Doublers' Association, was elected president.

IN CONSEQUENCE of the cost of living index figures having fallen from 75 per cent. in January last to 68 per cent. at the beginning of the present month, approximately 100,000 operative dyers in Yorkshire, Lancashire, Cheshire and Scotland will, on the first pay day in May, suffer wage reductions varying from 8d. per week for juveniles to 1s. 10d. for male adults, and 2s. for male dyers and polishers in the Middleton district.

THE JOURNAL of the Royal Technical College Metallurgical Club, Glasgow, is enlarged with this issue, and contains some excellent photographs and photomicrographs. Its field can best be shown by reference to this April issue. Articles include:—"Improvements in High-Power Micrography," by Professor C. A. F. Benedicks, Ph.D.; "Aluminium Alloys in Engineering," by Dr. H. Hyman; "The Action of Cyanide on Metals and Minerals," by R. Hay, B.Sc.; "Fireclay Refractories," by J. F. Hislop, B.Sc.; "Iron, Carbon and Nitrogen," by W. Watson, B.Sc.; and "The Problem of the Fuel Cell," by V. R. Evans, M.A. The Secretary may be addressed at the Metallurgical Club, Royal Technical College, Glasgow, and the Editor of the Journal is Mr. H. A. Dickie.

MR. WALTER BUTTERWORTH, of Manchester, who was on Wednesday elected president of the Society of Glass Technology at the annual meeting at Sheffield, alluded to the fact that the foreign membership continued to grow and the British membership was losing in proportion. The foreign membership now covered nineteen countries. They must see to it that the British membership was maintained. Glass manufacturers were now working much more together than ever before or than ever it was dreamed that they would do ten years ago, when the Society was founded. The Society was taking a prominent part in the promotion of a suggested convention of the glass industry which it was proposed to hold in London this year and in connection with which there would be an exhibition. Mr. Butterworth is managing director of Butterworth Brothers, Ltd., Newton Heath, and is the first manufacturer, as distinguished from a scientist, to occupy the office.

IN LONDON BANKRUPTCY COURT on Tuesday, before Mr. Registrar Mellor, application for discharge was made on behalf of Karl Tage Sebastian Stromwall, 39, Lombard Street, E.C., merchant. The debtor failed in November last, with liabilities £11,366 and no assets. It appeared from the Official Receiver's report that in March, 1913, the debtor commenced business as a commission agent for the sale of iron, steel, chemicals, etc., at 11, Queen Victoria Street, where he traded until March, 1914. He then joined another person in partnership, but in March, 1919, that partnership was dissolved. The debtor then took an office at 40, Queen Victoria Street and continued agencies for the sale of wood, tar, pitch, turpentine, rosin, etc., and also traded on his own account in iron, steel, and chemicals. In March, 1921, he entered into an agreement with a Swedish firm for the sale on commission of iron, steel, etc. In May, 1921, Stromwall and Co., Ltd., was registered to provide capital and to take over his business and agencies. He was appointed managing director at £1,000 per annum, which position he held until an order was made for the liquidation of the company in March, 1925. Debtor attributed his failure to losses in trading, inability to collect debts and to the failure of Stromwall and Co., Ltd., and to liability for call on 4,800 shares in it. The Registrar suspended the discharge for three years and six months.

Obituary

PROFESSOR W. J. LEWIS, F.R.S., professor of Mineralogy at Cambridge University since 1881, aged 79.

MR. W. ROBERTSON, late of the firm of W. and A. Robertson, sheep dip manufacturers, Aberfeldy, aged 85.

MR. JAMES CALVERT ROLLIN, J.P., of Hexham, and late of Stocksfield, aged 81. He was formerly a chemical manufacturer on Tyneside.

MR. WILLIAM CHARLESWORTH at Whitstable, aged 75. He had over fifty years' service at Woolwich Arsenal which he entered at the age of 10, and after the war he was chief designer in the Royal laboratory and afterwards technical adviser to the superintendent of the laboratory.

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Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each

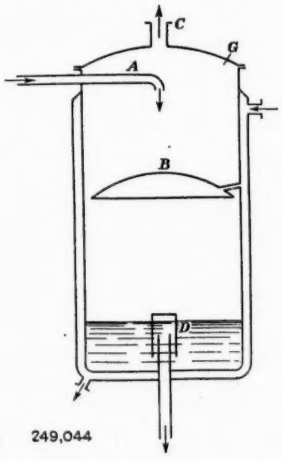
Abstracts of Complete Specifications

249,041. Pure Urea, Manufacture and Production of. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, November 5, 1925.

The object is to obtain pure urea as a product without the necessity of dissolving it and then purifying it by means of animal charcoal. This is done by treating concentrated solutions of commercial urea with oxidising agents in the presence of at least ½ to 1 per cent. of ammonia. The oxidising agents employed should be such as will leave no soluble residues which it would be difficult to separate from the urea, *e.g.*, air, oxygen, manganese dioxide. The oxidation and removal of the precipitated impurities are effected at 60 to 70° C. and in a short time. This process removes compounds of heavy metals which are present. Thus a solution of urea containing 1·5 per cent. of ammonia is treated with air injected tangentially into it and the oxidation is complete in one and a half to two hours.

249,044. Continuous Separation of Sulphur from Sulphur Solutions, Process for. E. Legeler, Westhavelland, Premnitz, Germany. International Convention date, July 6, 1925.

When sulphur is crystallised from sulphur solutions, some of the solvent is enclosed by the crystals, and the object is to provide a continuous process for separating sulphur which avoids this disadvantage. The sulphur solution is placed in a vessel G heated by a jacket, and having a plate B at about half its height. This plate is heated above the boiling point of the solvent, and at least above the melting point of the sulphur. The solution flows through a pipe A and drops on the plate B heated to about 120° C., whereby the solvent is evaporated and is drawn off through a pipe C. The molten sulphur drops into the bottom of the vessel G, and is drawn off through a syphon D.



249,044

249,309. Refining Hydrocarbons. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, March 9, 1925.

The process is for refining industrial hydrocarbons, *e.g.*, tar or tar fractions from ordinary or low temperature carbonisation, and from any material such as coal, lignite, cracked oil or distillates, or other hydrocarbon fractions. The oil is refined by distilling with non-superheated steam in the presence of an alkaline hydroxide or alkaline earth metal hydroxide. The phenolic substances are thus completely removed and complete desulphurisation effected. The proportion of low boiling constituents is sometimes increased. The hydrocarbon oils can be further improved by subsequently treating with hydrogen or gases containing hydrogen in the presence of finely-divided metals, *e.g.*, nickel, copper, iron, cobalt, or platinum. Hydrogenation of unsaturated compounds may or may not take place.

In an example, low temperature carbonisation tar containing 15 per cent. of phenols, 1 per cent. of sulphur, and 10 per cent. of compounds distilling below 140° C. is mixed with sodium hydroxide or slaked lime and water and distilled in a current of saturated steam at ordinary pressure. The distillate is free from phenol and contains only 0·1 per cent. of sulphur. It can be used directly as a motor fuel.

249,312. Purifying Coal or other Gases, Process for. J. N. Reeson, Pasadena Mansions, St. Kilda Road, Melbourne, and W. L. Moss, 15, Royal Crescent, Camberwell, Victoria, Australia. Application date, March 11, 1925.

Coal and other gases are purified by washing with a neutral solution of iron hydroxide. The hydroxide is obtained by adding to the solution of an iron salt any substance capable of precipitating it directly or as an oxidation product, *e.g.*, the hydrate or carbonate of sodium, potassium, and ammonium, or organic bases such as pyridine or quinoline. The iron hydroxide is dissolved in substances such as salicylic acid, parahydroxy-benzoic acid, phthalic acid and the alkali salts, polyhydric alcohols and their derivatives including the glycols, and glycerine, citric acid, and citrates.

This solution removes hydrogen sulphide from the gas, and the carbon bisulphide and thiophene partly by the suspended sulphur obtained during the regeneration of the solution and partly as thiocarbonate which becomes oxidised on regeneration. The solution is regenerated by means of air or oxygen, during which process some polythionic acids are formed, which consume part of the alkali used. Further alkali is added to keep the solution neutral. The sulphur acids which accumulate are recovered periodically as sodium thiosulphate and sulphate.

249,370. Solid Calcium Nitrates, Manufacture and Production of. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, May 29, 1925.

It is known that when hot highly concentrated calcium nitrate solution is cooled, solidification is very slow, owing to the viscous nature of the products which are first formed. It has now been found that a solid product can be readily obtained from concentrated calcium nitrate solution if a small proportion of an ammonium salt is added, *e.g.*, about 1·7 to 5 per cent. of ammonium nitrate. Other ammonium salts such as the sulphate, or compounds such as urea which are converted into ammonium compounds by the hot calcium nitrate solution may also be used. The solidification of the calcium nitrate solution may be effected by stirring while cooling, or by spreading on a cooled revolving drum, or by spraying the solution in a current of air.

In an example, hot calcium nitrate solution of 70° Bé. is mixed with 5 per cent. of ammonium nitrate and the mixture stirred while cooling. Solidification commences at 70° C. instead of 30° C., as with pure calcium nitrate. If the same solution is sprayed by compressed air a granular product is at once obtained. The presence of the ammonia does not affect the stability, and it increases the nitrogen content.

249,402. Barium Hydroxide from Barium Sulphide, Production of. A. Jahl, 11, Kirchplatz, Linz-on-Rhine, Germany. International Convention date, April 18, 1925.

Solid barium sulphide is mixed with a solution of a soluble polysulphide or caustic alkali or hydroxide of an alkaline earth metal, and the mixture leached with hot water. Barium hydroxide is deposited on cooling. The barium sulphide is stirred with the solutions or with a suspension of calcium hydroxide in water. The mixing is at such a rate that the solution is taken up by the barium sulphide without becoming

moist. The leaching is effected with water at 70° to 100° C., so as to obtain a solution of 30° Bé. or more, which is cooled to 20° C. to precipitate the barium hydroxide. The residual barium sulphide solution may be treated with sodium hydroxide. The barium sulphide employed may be obtained by calcining barium carbonate with sulphur and carbonaceous reducing agents. The barium carbonate can be obtained by treating with carbon dioxide the mother liquor remaining after the barium hydroxide has been separated.

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Carpmael, W., and I. G. Farbenindustrie Akt.-Ges. Manufacture of 1 : 4-diarylamino-5 : 8-dioxyanthraquinone. 9,726. April 13.

Carbould, W. H. Hydrometallurgical treatment of oxide products of lead, etc. 9,755. April 13.

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Flor, K., Lichtenberger, T., and Salzwerk Heilbronn Akt.-Ges. Process for obtaining sulphur from sulphates of earth alkalies. 10,086. April 16. (Germany, December 21, 1925.)

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I. G. Farbenindustrie Akt.-Ges. Manufacture of organic compounds. 9,862. April 14. (Germany, April 25, 1925.)

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I. G. Farbenindustrie Akt.-Ges. Manufacture of tanning agents. 10,083. April 16. (Germany, October 28, 1925.)

I. G. Farbenindustrie Akt.-Ges. Manufacture of derivatives of the anthraquinone series. 10,148. April 17. (Germany, April 17, 1925.)

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Ramsay, D. M. Distillation of carbonaceous materials. 9,788. April 14.

Schueler, G. R. Apparatus for hydrogenation of liquids. 10,000. April 16.

Scottish Dyes, Ltd., Thomas, J., and Wilson, J. S. Dyeing and printing vat colours. 9,622. April 12.

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Silver Springs Bleaching and Dyeing Co., Ltd. Processes for dyeing furs, etc. 9,802. April 14.

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The Cause of Catalytic Action

Important American Discovery

PROFESSOR H. S. TAYLOR, of Princeton University, U.S.A., is understood to have succeeded in finding an explanation of the activity of catalytic agents in chemical reactions, and he is now on a lecture tour communicating the results of the research to various sections of the American Chemical Society and to several of the Western universities.

Earlier experiments conducted by Professor Taylor demonstrated that a catalyst is a composite material having in its structure atoms of varying efficiency and, according to the *Princetonian*, his investigations have now shown that the abnormal activity of gases in the presence of catalytic agents is caused by the fact that the most active of the catalyst atoms change the reacting gases from the molecular to the atomic condition.

Mr. Wolfended, a visiting Fellow of Oxford, who has been working in the Princeton laboratory, is stated to have shown that hydrogen gas in the molecular state, when exposed to active nickel, reveals hydrogen atoms. Dr. George Kistakowski, an international research Fellow from the University of Berlin, succeeded in showing that nitrogen atoms are present in an iron catalyst when it is exposed to gaseous nitrogen in the molecular state.

By an entirely independent method, Dr. Fryling, of New York University, has established that the amount of the hydrogen gas which is converted to atoms on the surface of nickel catalysts is very materially increased if suitable forms of the catalysts are prepared by introducing small amounts of oxides which act as supports for the catalytic metal.

Faraday Society Activities

A GENERAL discussion on "Explosive Reactions in Gaseous Media" is being organised by the Faraday Society, to take place on Thursday, May 13, at the Institution of Mechanical Engineers. The proceedings will be divided into two sessions. The first, from 2.30 to 6.30, will deal with the subject generally, and Professor H. B. Dixon, F.R.S., will preside. An introductory survey will be given by Dr. W. E. Garner, and papers initiating discussion will be presented by Professors Dixon, W. T. David, and W. A. Bone, and Drs. S. W. Saunders, R. V. Wheeler, and C. Campbell. The second session, 7.45 to 10, will deal with "Explosive Reactions Considered in Reference to Internal-Combustion Engines." Sir Dugald Clerk, F.R.S., will preside and give an introductory survey, being followed by Professor David and Mr. H. T. Tizard. A dinner will be held between the sessions at the St. Ermin's Hotel. A full programme can be obtained on application to Mr. F. S. Spiers, 90, Great Russell Street, London, W.C.1.

The transactions of the Faraday Society, which have hitherto appeared three times a year, will in future be published bi-monthly, in order to expedite the publication of papers presented to the Society. In addition to the six bi-monthly parts, reports of two general discussions will be published annually, one in the spring and one in the autumn. The new arrangement begins with Volume XXII, 1926. The Publication Committee of the Society will be glad to consider papers on any branch of pure or applied physical chemistry, and under the new arrangement rapid publication will be ensured. Communications should be addressed to the Secretary and Editor, 90, Great Russell Street, London, W.C.1.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID BORIC, COMMERCIAL.—Crystal, £37 per ton, Powder, £39 per ton.

ACID HYDROCHLORIC.—3s. 9d. to 6s. per carboy d/d, according to purity, strength, and locality.

ACID NITRIC, 80° TW.—£21 10s. to £27 per ton, makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA ALKALI.—£6 15s. per ton f.o.r. Special terms for contracts.

BISULPHITE OF LIME.—£7 10s. per ton, packages extra, returnable.

BLEACHING POWDER.—Spot, £9 10s. d/d; Contract, £8 10s. d/d, 4-ton lots.

BORAX, COMMERCIAL.—Crystal, £23 per ton. Powder, £24 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

CALCIUM CHLORATE (SOLID).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carr. paid.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE.—4½d. per lb.

POTASSIUM CHLORATE.—3⅞d. per lb., ex wharf, London, in cwt. kegs.

SALAMMONIAC.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE.—£3 15s. to £4 per ton d/d. In bulk.

SODA CAUSTIC, SOLID.—Spot lots delivered, £15 2s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

SODA CRYSTALS.—£5 to £5 5s. per ton ex railway depots or ports.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE.—£10 10s. per ton, carr. paid.

SODIUM BICHROMATE.—3½d. per lb.

SODIUM BISULPHITE POWDER 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

SODIUM CHLORATE.—3d. per lb.

SODIUM NITRITE, 100% BASIS.—£27 per ton d/d.

SODIUM PHOSPHATE.—£14 per ton, f.o.r. London, casks free.

SODIUM SULPHATE (GLAUBER SALTS).—£3 12s. 6d. per ton.

SODIUM SULPHIDE CONC. SOLID, 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. paid.

SODIUM SULPHIDE CRYSTALS.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. paid.

SODIUM SULPHITE, PEA CRYSTALS.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—4⅞d. to 5d. per lb. Crude 60's, 1s. 5d. to 1s. 6d.

ACID CRESYLIC 97/99.—1s. 8d. to 2s. 3d. per gall. Pale, 95%, 1s. 6d. to 1s. 7d. per gall. Dark, 1s. 3d. to 1s. 4d. per gall. Steady.

ANTHRACENE.—A quality, 3d. to 4d. per unit.

ANTHRACENE OIL, STRAINED.—7d. to 8d. per gall. Unstrained, 6½d. to 7½d. per gall.

BENZOL.—Crude 65's, 1s. 2½d. to 1s. 3½d. per gall., ex works in tank wagons. Standard Motor, 1s. 9d. to 1s. 11d. per gall., ex works in tank wagons. Pure, 1s. 10d. to 2s. 4d. per gall., ex works in tank wagons.

TOLUOL.—90%, 1s. 9½d. to 2s. 1d. per gall. Pure, 1s. 11d. to 2s. 3d. per gall.

XYLOL.—2s. 3d. to 2s. 6d. per gall.

CREOSOTE.—Cresylic, 20/24%, 9d. to 10d. per gall. Standard specification, middle oil, heavy, 6½d. to 7½d. per gall.

NAPHTHA.—Crude, 9d. to 1s. per gall. Solvent 90/160, 1s. 5d. to 2s. per gall. Steady demand. Solvent 90/190, 1s. to 1s. 4d. per gall.

NAPHTHALENE CRUDE.—Drained Creosote Salts, £3 10s. to £5 per ton. Whizzed or hot pressed, £5 to £7 10s.

NAPHTHALENE.—Crystals and Flaked, £11 10s. to £13 per ton, according to districts.

PITCH.—Medium soft, 80s. to 87s. 6d. per ton, according to district.

PYRIDINE.—90/140, 18s. to 21s. per gall. Firmer. Heavy, 7s. to 10s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—7s. per lb. 100%.

ACID BENZOIC.—1s. 9d. per lb.

ACID GAMMA.—8s. per lb.

ACID H.—3s. 3d. per lb. 100% basis d/d.

ACID NAPHTHIONIC.—2s. 2d. per lb. 100% basis d/d.

ACID NEVILLE AND WINTHER.—4s. 9d. per lb. 100% basis d/d.

ACID SULPHANILIC.—9d. per lb. 100% basis d/d.

ANILINE OIL.—7d. per lb. naked at works.

ANILINE SALTS.—7d. to 7½d. per lb. naked at works.

BENZALDEHYDE.—2s. 1d. per lb. Fair home inquiry.

BENZIDINE BASE.—3s. 3d. per lb. 100% basis d/d.

o-CRESOL 29/31° C.—3d. to 3½d. per lb. Demand quiet.

m-CRESOL 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-CRESOL 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—1s. 11d. to 2s. per lb. d/d. Drums extra.

DINITROBENZENE.—9d. per lb. naked at works.

DINITROCHLORBENZENE.—£84 per ton d/d.

DINITROTOLUENE.—48/50° C. 8d. per lb. naked at works. 66/68° C. 9d. per lb. naked at works.

DIPHENYLANILINE.—2s. 10d. per lb. d/d.

a-NAPHTHOL.—2s. per lb. d/d. Fair home inquiry.

B-NAPHTHOL.—11d. to 1s. per lb. d/d. Fair home inquiry.

a-NAPHTHYLAMINE.—1s. 3d. per lb. d/d. Fair home inquiry.

B-NAPHTHYLAMINE.—3s. 2d. per lb. d/d. Fair home inquiry.

o-NITRANILINE.—5s. 9d. per lb.

m-NITRANILINE.—3s. 3d. per lb. d/d.

p-NITRANILINE.—1s. 9d. per lb. d/d. Fair home inquiry.

NITROBENZENE.—5d. per lb. naked at works. Fair home inquiry.

NITRONAPHTHALENE.—10d. per lb. d/d.

R. SALT.—2s. 4d. per lb. 100% basis d/d.

SODIUM NAPHTHIONATE.—1s. 9d. per lb. 100% basis d/d.

o-TOLUIDINE.—8d. per lb. naked at works.

p-TOLUIDINE.—2s. 2d. per lb. naked at works.

m-XYLIDINE ACETATE.—2s. 11d. per lb. 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 15s. to £9. Firmer. Grey, £17 10s. per ton. Better inquiry. Liquor, 9d. per gall. 32° Tw.

ACETONE.—£81 per ton.

CHARCOAL.—£7 5s. to £9 per ton, according to grade and locality. Demand good.

IRON LIQUOR.—1s. 6d. per gall. 32° Tw. 1s. 2d. per gall., 24° Tw.

RED LIQUOR.—9½d. to 1s. per gall.

WOOD CREOSOTE.—2s. 9d. per gall. Unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 10d. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.

WOOD TAR.—£3 to £5 per ton, according to grade.

BROWN SUGAR OF LEAD.—£40 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 3d. to 1s. 7½d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—2s. per lb.

BARYTES.—£3 10s. to £6 15s. per ton, according to quality.

CADMIUM SULPHIDE.—2s. 9d. per lb.

CARBON BISULPHIDE.—£20 to £25 per ton, according to quantity.

CARBON BLACK.—5½d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£46 to £55 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—3s. 9d. per lb.

INDIARUBBER SUBSTITUTES, WHITE AND DARK.—5½d. to 6½d. per lb.

LAMP BLACK.—£35 per ton, barrels free.

LEAD HYPOSULPHITE.—9d. per lb.

LITHOPONE 30%.—£22 10s. per ton.

MINERAL RUBBER "RUBPRON."—£13 12s. 6d. per ton f.o.r. London.

SULPHUR.—£9 to £11 per ton, according to quality

SULPHUR CHLORIDE.—4d. per lb., carboys extra.

SULPHUR PRECIP. B.P.—£47 10s. to £50 per ton.

THIOCARBAMIDE.—2s. 6d. to 2s. 9d. per lb. carriage paid.

THIOCARBANILIDE.—2s. 1d. to 2s. 3d. per lb.

VERMILION, PALE OR DEEP.—5s. 3d. per lb

ZINC SULPHIDE.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic, 80% B.P.—£39 per ton ex wharf London in glass containers.

Acid, Acetyl Salicylic.—2s. 4d. to 2s. 5d. per lb. Keen competition met. Good demand.

Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.

Acid, Boric B.P.—Crystal, £43 per ton; Powder, £47 per ton. Carriage paid any station in Great Britain, in ton lots.

Acid, Camphoric.—19s. to 21s. per lb.

Acid, Citric.—1s. 4d. to 1s. 4½d. per lb., less 5%.

Acid, Gallic.—2s. 8d. per lb. for pure crystal, in cwt. lots.

Acid, Pyrogallic, Crystals.—6s. 7d. per lb. Resublimed, 7s. 3d.

Acid, Salicylic.—1s. 3½d. to 1s. 4½d. per lb. Technical.—10¾d. per lb.

Acid, Tannic B.P.—2s. 10d. per lb.

Acid, Tartaric.—1s. 0½d. per lb., less 5%. Market firm.

Amidol.—6s. 6d. per lb., d/d.

Acetanilide.—1s. 7d. to 1s. 8d. per lb. for quantities.

Amidopyrin.—12s. 6d. per lb.

Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.

Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.

Atropine Sulphate.—11s. per oz. for English make.

Barbitone.—10s. per lb.

Benzonaphthol.—3s. 3d. per lb. spot.

Bismuth Carbonate.—12s. 6d. to 14s. 3d. per lb.

Bismuth Citrate.—9s. 6d. to 11s. 3d. per lb.

Bismuth Salicylate.—10s. 3d. to 12s. per lb.

Bismuth Subnitrate.—10s. 9d. to 12s. 6d. per lb. according to quantity.

Borax B.P.—Crystal, £27; Powder, £28 per ton. Carriage paid any station in Great Britain, in ton lots.

Bromides.—Potassium, 1s. 8½d. to 1s. 11d. per lb.; sodium, 1s. 11d. to 2s. 2d. per lb.; ammonium, 2s. 2d. to 2s. 5d. per lb., all spot.

Calcium Lactate.—1s. 3d. to 1s. 4½d.

Chloral Hydrate.—3s. 3d. to 3s. 6d. per lb., duty paid.

Chloroform.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

Creosote Carbonate.—6s. per lb.

Formaldehyde.—£40 per ton, in barrels ex wharf.

Guaiacol Carbonate.—7s. 6d. per lb.

Hexamine.—2s. 4d. to 2s. 6d. per lb.

Homatropine Hydrobromide.—30s. per oz.

Hydrastine Hydrochloride.—English make offered at 120s. per oz.

Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.

Hydroquinone.—4s. 3d. per lb., in cwt. lots.

Hypophosphites.—Calcium, 3s. 6d. per lb., for 28-lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

Iron Ammonium Citrate B.P.—2s. to 2s. 3d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 2s. 1d. to 2s. 4d. per lb.

Magnesium Carbonate.—Light Commercial, £31 per ton net.

Magnesium Oxide.—Light Commercial, £67 10s. per ton, less 2½%, price reduced; Heavy Commercial, £22 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

Menthol.—A.B.R. recrystallised B.P., 20s. net per lb. Synthetic, 15s. to 17s. per lb., according to quality. English make.

Mercurials.—Red oxide, 5s. 8d. to 5s. 10d. per lb.; Corrosive sublimate, 3s. 9d. to 3s. 11d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 4s. 3d. to 4s. 5d. per lb.

Methyl Salicylate.—1s. 7d. per lb.

Methyl Sulphonal.—16s. 6d. per lb.

Metol.—9s. per lb. British make.

Paraformaldehyde.—1s. 11d. for 100% powder.

Paraldehyde.—1s. 1d. to 1s. 4d. per lb.

Phenacetin.—4s. to 4s. 3d. per lb.

Phenazone.—6s. to 6s. 3d. per lb.

Phenolphthalein.—4s. to 4s. 3d. per lb.

Potassium Bitartrate 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots.

Potassium Citrate.—1s. 11d. to 2s. 2d. per lb.

Potassium Ferricyanide.—1s. 9d. per lb. in cwt. lots. Quiet.

Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity.

Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.

Potassium Permanganate.—B.P. crystals, 6¾d. per lb., spot, slightly easier.

Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.

Resorcin.—4s. to 5s. per lb., spot.

Saccharin.—55s. per lb. Better demand.

Salol.—3s. per lb.

Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.

Sodium Citrate, B.P.C., 1911.—1s. 8d. to 1s. 11d. per lb., B.P.C., 1923. 1s. 11d. to 2s. 2d per lb., according to quantity.

Sodium Ferrocyanide.—4d. per lb. carriage paid.

Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.

Sodium Nitroprusside.—16s. per lb.

Sodium Potassium Tartrate (Rochelle Salt).—75s. to 80s. per cwt., according to quantity.

Sodium Salicylate.—Powder, 1s. 9d. to 1s. 10d. per lb. Crystal, 1s. 10d. to 1s. 11d. per lb. Good demand.

Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.

Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.

Sulphonal.—11s. 6d. per lb. Limited demand.

Tartar Emetic, B.P.—Crystal or Powder, 1s. 10d. to 1s. 11d. per lb.

Thymol.—12s. to 13s. 9d. per lb. Strong demand.

Perfumery Chemicals

Acetophenone.—9s. per lb.

Aubepine (ex Anethol).—9s. 6d. per lb.

Amyl Acetate.—3s. per lb.

Amyl Butyrate.—6s. 6d. per lb.

Amyl Salicylate.—3s. 3d. per lb.

Anethol (M.P. 21/22° C.).—5s. 6d. per lb.

Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 3d. per lb.

Benzyl Alcohol free from Chlorine.—2s. 3d. per lb.

Benzaldehyde free from Chlorine.—2s. 6d. per lb.

Benzyl Benzoate.—2s. 9d. per lb.

Cinnamic Aldehyde Natural.—17s. 6d. per lb.

Coumarin.—11s. 9d. per lb.

Citronellol.—15s. per lb.

Citral.—9s. per lb.

Ethyl Cinnamate.—9s. per lb.

Ethyl Phthalate.—3s. per lb.

Eugenol.—9s. 6d. per lb.

Geraniol (Palmarosa).—19s. 3d. per lb.

Geraniol.—7s. to 16s. per lb.

Heliotropine.—6s. per lb.

Iso Eugenol.—14s. per lb.

Linalol ex Bois de Rose.—17s. 6d. per lb.

Linalyl Acetate.—18s. per lb.

Methyl Anthranilate.—9s. 3d. per lb.

Methyl Benzoate.—5s. per lb.

Musk Ketone.—34s. 6d. per lb.

Musk Xylol.—8s. per lb.

Nerolin.—4s. per lb.

Phenyl Ethyl Acetate.—12s. per lb.

Phenyl Ethyl Alcohol.—9s. 6d. per lb.

Rhodinol.—27s. 6d. per lb.

Safrol.—1s. 8d. per lb.

Terpineol.—1s. 6d. per lb.

Vanillin.—21s. 6d. to 23s. per lb. Good demand.

Essential Oils

Almond Oil.—12s. 6d. per lb.

Anise Oil.—3s. 2d. per lb.

Bergamot Oil.—32s. 6d. per lb.

Bourbon Geranium Oil.—11s. 3d. per lb.

Camphor Oil.—60s. per cwt

Cinnamon Oil, Leaf.—5d. per oz.

Cassia Oil, 80/85%.—9s. 6d. per lb.

Citronella Oil.—Java, 85/90%, 3s. Ceylon, 2s. per lb.

Clove Oil.—6s. 9d. per lb.

Eucalyptus Oil, 70/75%.—1s. 10d. per lb.

Lavender Oil.—French 38/40%, Esters, 21s. 6d. per lb.

Lemon Oil.—9s. per lb.

Lemongrass Oil.—4s. 9d. per lb.

Orange Oil, Sweet.—11s. 9d. per lb.

Otto of Rose Oil.—Bulgarian, 65s. per oz. Anatolian, 40s. per oz.

Palma Rosa Oil.—12s. per lb.

Peppermint Oil.—Wayne County, 70s. per lb. Japanese, 12s. per lb.

Petitgrain Oil.—9s. per lb.

Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 17s. 3d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd. and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, April 22, 1926.

BUSINESS this week has been of the quietly steady order and it is quite evident that many buyers are more or less waiting for the settlement of the present industrial difficulties.

There appears to be slightly more competition on the part of the continental suppliers, but otherwise there is not a great deal of interest to report and prices remain, on the whole, distinctly firm.

Export trade is a shade better but still leaves a good deal to be desired.

General Chemicals

ACETONE has only been in moderate demand but the price is well maintained at from £81 to £82 per ton.

ACID ACETIC is unchanged and in fair request at £37 to £39 per ton for 80% technical and with £1 per ton extra for pure.

ACID FORMIC is extremely firm and is quoted at £50 10s. per ton for 85%.

ACID LACTIC is also unchanged and in bright demand at £43 10s. for 50% by weight.

ACID OXALIC is in poor demand but prices are fairly well held at 3¾d. per lb.

ACID TARTARIC is firm and the material is in fair demand at 11½d. per lb.

ALUMINA SULPHATE is not quite so active, but the price is unchanged at £5 15s. per ton.

AMMONIUM CHLORIDE continues dull for all positions and price is barely steady at £18 per ton.

ARSENIC.—This product still hangs fire, although a slightly better inquiry is to be noted, price unchanged at £13 10s. to £14 per ton.

BARIUM CHLORIDE is in slightly better supply, with price a shade easier for forward delivery.

EPSOM SALTS are unchanged, with the quotation extremely firm at £5 15s. per ton.

FORMALDEHYDE continues easy and there is only a small business passing at £41 to £43 per ton.

IRON SULPHATE is unchanged and in steady request.

LEAD ACETATE is firm and is quoted at £45 for white, with brown at about £43 per ton.

METHYL ALCOHOL.—A fair amount of business is passing, but price is quite easy at £45 per ton.

METHYL ACETONE remains fairly firm and supplies can be obtained at from £57 to £60 per ton.

POTASSIUM CARBONATE AND CAUSTIC.—The expected higher prices have not yet materialised, while the demand remains only fair.

POTASSIUM CHLORATE is fairly active, with spot supplies on the short side, with the material being offered at about 3¾d. per lb.

POTASSIUM PERMANGANATE is active and price is unchanged at 6d. per lb. for Commercial and 7¼d. per lb. for B.P.

POTASSIUM PRUSSIATE has been a bright spot and the price is well held at 7¼d. per lb.

SODIUM ACETATE continues scarce, with works fully sold for months ahead. The quotation is extremely firm at £21 to £22 per ton.

SODIUM BICHROMATE is only moderately active at British makers' figures.

SODIUM CHLORATE.—The quotation is about 3¼d. per lb. with a small demand.

SODIUM NITRITE is dull and is quoted at £21 per ton.

SODIUM PHOSPHATE.—A fair demand is experienced and price is fairly firm at £13 10s. to £14 per ton.

SODIUM PRUSSIATE.—A better business is reported at the current figure of 4d. per lb.

SODIUM SULPHIDE continues on the slow side, without appreciable change in value.

ZINC SULPHATE is somewhat easier, but demand has been good at round about £12 per ton.

Coal Tar Products

The market generally for Coal Tar Products is unchanged from last week.

90's BENZOL is unchanged at 1s. 9½d. per gallon on rails.

PURE BENZOL is quoted at 2s. 1d. to 2s. 2d. per gallon on rails.

CREOSOTE OIL is offered at 5¾d. to 6d. per gallon on rails in the North, while the price in London is 6¾d. to 7d. per gallon.

CRESYLIC ACID is quoted at 1s. 9d. to 1s. 10d. per gallon on rails for the Pale quality 97/99%, for export, while the Dark quality 95/97% is quoted at 1s. 7d. to 1s. 8d. per gallon on rails, also for export. The ordinary Pale quality 97/99% for the home trade is worth about 1s. 6d. per gallon on rails, while the dark quality 95/97% is quoted at 1s. 4d. per gallon on rails.

SOLVENT NAPHTHA is firm at 1s. 5d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. to 1s. 1d. per gallon on rails.

NAPTHALENES are unchanged, the lower grades being worth from £3 10s. to £4 5s. per ton, 76/78 quality about £6 per ton, and 74/76 quality about £5 to £5 10s. per ton.

PITCH.—There is no new feature to report; the demand is quiet and prices are fairly well maintained at 80s. to 85s. per ton, f.o.b. U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL quiet and 2s. 6d. lower. Spot, £30 10s., ex mill; April, £29 12s. 6d.; May-August and September-December, £30. RAPE OIL steady. Crude crushed, £49, nominal; technical refined, £49 10s. COTTON OIL steady. Refined common edible, £42; Egyptian crude, £36; deodorised, £44. TURPENTINE quiet and 9d. to 3d. per cwt. lower for near. American, spot and May-June, 63s.; and July-December, 59s. 9d.

HULL.—LINSEED OIL, naked spot, £30 7s. 6d.; April and May-August, £30 10s.; September-December, £30 15s. COTTON OIL—Naked Bombay crude, £35; Egyptian crude, £36 5s.; edible, refined, £39 10s.; technical, £38 10s. PALM KERNEL OIL.—Crushed naked, 5½ per cent., £42. GROUND NUT OIL.—Crushed extracted, £44 5s.; deodorised, £48 5s. SOYA OIL.—Extracted and crushed, £36 10s.; deodorised, £40. RAPE OIL.—Crude extracted, £47; refined, £49 per ton, net cash terms, ex mill. CASTOR OIL and COD OIL unaltered.

Nitrogen Products Market

Export.—The price for prompt shipment from U.K., and the continental sellers are selling at equivalent prices, is £12 10s. per ton, f.o.b. U.K. port, in single bags. On account of the heavy home demand the quantities available for export from Great Britain are negligible. The price for May shipment is somewhat easier and British producers are quoting £12 5s. per ton, same basis as above. The demand continues from the Far East and the Continent and it appears that very little stock will be carried over in any country when the season ends on May 31.

Home.—Merchants in various parts of the country report increased sales. The demand has been particularly heavy in the South of England and producers in this area have been hard put to it to meet buyers' requirements. There seems every indication that the total home consumption will be 10 per cent. above that of last year.

Nitrate of Soda.—The nitrate market continues steady, cargoes c.i.f. chief European port are still changing hands at £11 11s. to £11 14s. per ton. The price of nitrate to consumers works out just a little above the price of sulphate—making the price per unit of nitrogen much heavier in this form than in the form of sulphate. The greatest progress in nitrate consumption has been in the United States, but stocks on the Continent and in Egypt are being steadily liquidated.

Calcium Cyanamide

CONSIDERABLE interest is being shown in this fertiliser at the present time. Calcium cyanamide contains 19 per cent. nitrogen and about 60 per cent. lime. The price to farmers for April delivery is £10 6s. per ton for 4-ton lots, carriage paid, to any railway station in Great Britain. The unit price to the farmer of the nitrogen supplied by calcium cyanamide is thus 10s. 10d. per unit.

Fall in Nitrate Consumption

ACCORDING to figures given in the latest circular of Aikman (London), Ltd., a very considerable reduction is likely to occur during the next twelve months in the world consumption of nitrate of soda.

The demand in the United States, it is reported, continues unsatisfactory, and the latest advices estimate consumption July 1, 1925, to June 30, 1926, at not exceeding 875,000 tons, against 1,030,000 tons last year. In Europe and Egypt deliveries appear likely to reach about 1,000,000 tons, against 1,170,000 tons, and in Japan and other countries about 175,000 tons, against 140,000 tons for the same periods. On the above estimates the world's consumption July 1, 1925, to June 30, 1926, would be reduced to 2,050,000 tons, against 2,340,000 tons for the previous year. On this basis, stocks at June 30, 1926, would amount to about 370,000 tons (a large proportion of which will be protected by the fall clause), of which about 235,000 tons would be held in Europe and 135,000 tons in the United States, as compared with stocks at June 30, 1925, of 103,000 and 47,000 tons respectively.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, April 22, 1926.

POSSIBLY due to some extent to the unsatisfactory situation in the coal industry business has been rather slack during the past week, buyers apparently holding off until a more definite indication of the probable course of events is apparent.

Prices both for home and continental products are at about the same level as last reported, with the exception of arsenic, which is again a trifle lower.

Industrial Chemicals

ACID ACETIC.—98/100% quoted £55 to £67 per ton, according to quantity and packing c.i.f. U.K. port. 80% pure £40 to £41 per ton; 80% technical £38 to £39 per ton, packed in casks c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flakes £37 per ton; powdered £39 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—Still in poor demand and prices again lower at about 4¾d. per lb. delivered or f.o.b. U.K. ports.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 3¼d. per lb. less 5% ex wharf. Quoted 1s. 3d., less 5%, ex wharf, to come forward.

ACID FORMIC, 85%.—Quoted about £50 per ton, ex wharf, early delivery. Offered from the continent at £49 per ton, c.i.f. U.K. ports.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—Remains unchanged at £23 5s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Quoted 3⅝d. per lb., c.i.f. U.K. ports, duty paid. Spot material available at about 3¾d. per lb., ex store.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—In little demand and quoted price unchanged at about 11¼d. per lb, less 5%, ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—On offer from the continent at about £5 8s. 6d. per ton, c.i.f. U.K. ports. Spot material quoted £6 5s. per ton, ex store.

ALUM POTASH, LUMP.—Unchanged at about £7 12s. 6d., per ton, c.i.f. U.K. ports. Spot material quoted £9 per ton, ex store. Powdered quality 5s. per ton less. Powdered quality offered from the continent at about £7 7s. 6d., per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Imported material on offer at about 11½d. per lb., ex wharf; containers extra and returnable. This price could probably be shaded for fairly large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks delivered or f.o.b. U.K. ports.

AMMONIA LIQUID 880°.—Unchanged at about 2½d. to 3d. per lb. delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £24 to £26 per ton, ex station. On offer from the continent at about £21 15s. per ton, c.i.f. U.K. ports. Fine white crystals offered from the continent at about £18 10s. per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED CORNISH.—Offered for early delivery at about £16 per ton, ex wharf. Quoted £16 15s. per ton, ex store, spot delivery.

BARIUM CHLORIDE, 98/100%.—Fine white crystals quoted £8 15s. per ton c.i.f. U.K. ports, prompt shipment from the continent. Spot material available at about £10 15s. per ton, ex store.

BLEACHING POWDER.—English material unchanged at £9 10s. per ton, ex station. Contracts 20s. per ton less. Continental on offer at about £7 12s. 6d. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £22 10s. per ton; crystals, £23 per ton; powdered, £24 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English manufacturers' price unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, ex station. Continental on offer at £4 7s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—In moderate demand for export quoted £3 17s. 6d. per ton, c.i.f. U.K. ports. On offer for home consumption at about £3 10s. per ton, f.o.r. works.

COPPER SULPHATE, 99/100%.—Price for British material £23 10s. per ton, f.o.b. U.K. ports. Moderate inquiry for export. Continental on offer at about £22 per ton, ex wharf.

FORMALDEHYDE, 40%.—Unchanged at about £37 per ton, c.i.f. U.K. ports, prompt shipment. Spot material available at about £38 per ton, ex store.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental on offer at about £3 5s. per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material quoted £38 per ton, ex store.

LEAD, WHITE.—Quoted £37 per ton, c.i.f. U.K. ports. Spot material available at about £38 15s. per ton, ex store.

LEAD ACETATE.—White crystals on offer from the continent at about £44 15s. per ton, c.i.f. U.K. ports. Brown about £39 10s. per ton, c.i.f. U.K. ports.

MAGNESITE, GROUND CALCINED.—Quoted £8 10s. per ton, ex store, in moderate demand.

POTASH, CAUSTIC 88/92%.—Syndicate prices vary from £25 10s. to £28 15s. per ton, c.i.f. U.K. ports, according to quantity and destination. Spot material available at about £29 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Spot material quoted £26 10s. per ton, ex store. Quoted £25 per ton, ex wharf, to come forward. 90/94% quality on offer at £22 10s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE 99/100%, POWDERED.—Continental prices rather dearer now, quoted £27 10s. per ton, c.i.f. U.K. port.

POTASSIUM NITRATE, SALTPETRE.—Quoted £22 5s. per ton, c.i.f. U.K. port, prompt shipment. Spot material available at about £25 per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 7½d. per lb., ex store. Spot delivery. To come forward 7d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Quoted 7½d. per lb., ex store. Spot material on offer from the continent at about 7¼d. per lb., ex wharf.

SODA CAUSTIC.—76/77%, £17 10s. per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £16 12s. 6d. per ton; powdered, 98/99%, £20 17s. 6d. per ton; all carriage paid U.K. stations, spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Spot material scarce, but limited supplies available at £20 10s. per ton ex store. Quoted £19 15s. per ton c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton ex quay or station; M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English price unchanged at 3½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 per ton ex station, minimum 4-ton lots. Pea crystals, £4 10s. per ton ex station. Continental commercial quality on offer at about £8 5s. per ton c.i.f. U.K. ports.

SODIUM NITRATE.—Quoted £13 per ton ex store; 96/98% refined quality 7s. 6d. per ton extra.

SODIUM NITRITE 100%.—Quoted £24 per ton ex store. Offered from the Continent at about £22 5s. per ton c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Spot material quoted 4½d. per lb. ex store. On offer for early delivery at about 4¼d. per lb. ex wharf.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton ex works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—60/62% solid, £13 5s. per ton; broken, £14 5s. per ton; flake, £15 5s. per ton; crystals, 31/34%, £8 12s. 6d. per ton; all delivered buyer's works U.K., minimum 5-ton lots with slight reduction for contracts. 60/62% solid quality offered from the Continent at about £9 15s. per ton c.i.f. U.K. ports; broken, 15s. per ton more; crystals, 30/32%, £7 per ton c.i.f. U.K. ports.

SULPHUR.—Flowers, £11 10s. per ton; roll, £10 5s. per ton; rock, £10 5s. per ton; ground, £9 15s. per ton—ex store, spot delivery, prices nominal.

ZINC CHLORIDE.—British material, 96/98% quoted £23 15s. per ton f.o.b. U.K. port. 98/100% solid on offer from the Continent at about £21 15s. per ton c.i.f. U.K. ports; powdered, 20s. per ton extra.

ZINC SULPHATE.—Continental manufacture on offer at about £11 per ton ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

The market at the moment is very quiet and inquiries are for small quantities only.

H. ACID.—3s. 3d. per lb. per 100%. Some home inquiries.

NEVILLE AND WINTHER ACID.—4s. 9d. per lb. per 100%. Fair home inquiries.

SULPHANILIC ACID.—9d. per lb. per 100%. Some home inquiries.

ANILINE OIL.—7d. per lb. Small home inquiries.

BENZOIC ACID.—1s. 9d. per lb. Small home inquiries.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, April 23, 1926.

There has been little improvement in the demand for chemicals on the Manchester market during the past week. So far as the home trade is concerned, the bulk of the buying is of a day-to-day character, and contract business is on the slow side; naturally so, perhaps, in view of the industrial outlook. There are a fair number of enquiries about for India and the Colonies, but actual business on the export side has not been of great importance during the last few days.

Heavy Chemicals

The demand for sulphide of sodium has been rather inactive, with 60 to 65 per cent. concentrated quoted at about £11 per ton, and commercial crystals at £9 10s. There has been a fair enquiry for alkali, which keeps steady at £6 15s. per ton. A certain amount of business is being done in saltcake at £3 per ton; but the demand for this cannot be described as brisk. Glauber salts are still quiet at £3 7s. 6d. per ton, or a trifle less. Acetate of soda continues to show weakness, and about £20 per ton is to-day's value, although there is not a great deal of buying at this figure. Hyposulphite of soda meets with some enquiry at about £9 10s. per ton for commercial quality and £14 5s. for photographic. Phosphate of soda is in quiet demand, and keeps fairly steady at £12 15s. per ton. Caustic soda is steady, and unchanged at from £15 2s. 6d. per ton for 60 per cent. strength to £17 10s. for 76 per cent., and the demand for this material is still pretty good. Bicarbonate of soda is without change at round £10 10s. per ton, but there is only a quiet business being done. Bleaching powder is selling in moderate quantities at about £8 10s. per ton. Chlorate of soda continues to be offered at 3½d. to 3¾d. per lb., and the demand is on a quietly steady scale. Bichromate of soda is rather slow at the moment, but quotations are unaltered at about 3¾d. per lb.

Among the potash compounds yellow prussiate is displaying some weakness at round 7d. per lb., although this price might be shaded a little; the demand just now is inactive and enquiry slow. Permanganate of potash has not changed much since last week, but the tone is weak at about 7d. per lb. for pharmaceutical and 5d. to 5¼d. per lb. for commercial; business continues rather quiet. Caustic potash, 90 per cent. material, is fairly steady at about £27 per ton, and is selling in moderate quantities. There is a steadier feeling in the case of carbonate of potash, and prices are round £26 10s. per ton, a quiet demand being met with. Bichromate of potash, at 4¼d. per lb., shows no change in price, but there is only a slow business being put through. Chlorate of potash is steady, and meets with a moderate amount of enquiry at about 4d. per lb.

The demand for arsenic is still on a restricted scale, and seems likely to remain so for the time being; values, however, show no further weakness, and white powdered, Cornish makes, is quoted at £14 per ton, free on rails. The easy tendency of sulphate of copper is still to be observed, and from £23 15s. to £24 5s. per ton is about the present range of values; the demand for this material is relatively quiet. Grey acetate of lime is a quiet section, and weakness is still to be observed, about £16 5s. per ton being quoted now; brown is offered at from £7 15s. to £8 per ton. The firmness in the case of acetate of lead is still in evidence, £45 to £46 per ton being asked for white and £40 10s. per ton for brown. Nitrate of lead is not attracting a great deal of buying interest, but prices are steady here also at £40 to £41 per ton. Commercial Epsom salts are about unchanged at £3 12s. 6d. to £3 15s. per ton, with the demand just moderate; magnesium sulphate, B.P. quality, still offers at round £4 10s. per ton.

Acids and Tar Products

Oxalic acid is rather slow, and is easy again at 3½d. to 3⅝d. per lb. Citric acid is only in quiet demand, but quotations still range from 1s. 3d. to 1s. 3¼d. per lb. Tartaric acid is somewhat steadier at 11¼d. per lb., but there has not been much improvement in the amount of business done. Acetic acid is in quiet demand at £36 to £37 per ton for 80 per cent. commercial, with glacial still offered at £67.

In the coal-tar products market there is only a quiet demand for pitch, but ideas as to the values seem to be steady, with 77s. 6d. per ton, f.o.b. Manchester, currently quoted. Carbolic acid is inactive at 4¾d. per lb. for crystal and 1s. 4¾d. per gallon for crude. Solvent naphtha is slow, but fairly steady at round 1s. 6d. per gallon. Creosote oil is well maintained at 6¼d. to 6¾d. per gallon, and the demand for this is on a fair scale. Cresylic acid is quiet and unchanged at 1s. 10d. per gallon.

Weighing in Chemical Works

A visit was paid to the Soho foundry of W. and T. Avery, Ltd., by a joint meeting of the Birmingham and Midland Section of the S.C.I. with the Chemical Engineering Group on Tuesday. At a subsequent meeting a paper on "Measuring and Weighing Apparatus as applied to Chemical Works," was read by Mr. W. A. Benton, head of the research department of W. and T. Avery; and Messrs. W. Hale-Simmons and F. C. Sutton read a paper on "Rotation in Chemical Industry." Mr. Benton warned chemists to pay more attention, when purchasing laboratory instruments, to the construction of the mechanical parts, relieving devices, and the like, than to extreme sensitivity. Extreme sensitivity was by no means the most important quality in an ordinary laboratory or analytical balance. Accuracy and uniformity of operation were more vital qualities. Only the conservatism of chemists prevented the introduction of a simpler and cheaper type of high-class balance, in which no errors due to arm inequality could arise. A modern high-class weighbridge possessed sensitivity and accuracy of the same order as an ordinary chemical balance, in fact it would turn at a fraction of the total load not greater in amount than 1-200,000th part of the load. Granular materials could be automatically weighed to within much less than one-fifth of 1 per cent. of the true weight. He prophesied that in the near future every boiler in a modern power plant would be equipped to weigh and record all the coal consumed and the water evaporated, so that its actual efficiency could at any moment be ascertained.

Chemical Manufacturer's Flight Record

A new air record for a flight from London to the Continent was set up this week, when Mr. P. F. Berk, chairman of F. W. Berk and Co., Ltd., chemical manufacturers and makers of the BAA Accumulator Acid, flew 1,200 miles in 15½ hours. Mr. Berk's problem was how to be in Nuremburg by the afternoon and back in London for a conference at nine o'clock the next morning. The normal 80 hours' travel was actually condensed into 15½ hours by a D.H. (Napier-engined) machine, specially chartered from Imperial Airways. The pilot (Captain O. P. Jones), leaving Croydon at 6 a.m., flew *via* Brussels, Cologne and Frankfurt, and landed at Nuremburg at 1.50 p.m. Mr. Berk's business was not completed until 2.10 p.m., but Captain Jones managed to pass Dover on the return journey by 8.55 p.m., and Croydon was reached after a further 70 miles flight, in the dark, at 9.38 p.m. The flight reflects credit on all concerned, and Mr. Berk is to be congratulated on his successful enterprise.

Germany and British Dyestuffs Industry

As an indication of the close attention which is being paid by Germany to the development of the dyestuffs industry in this country, it is worthy of note that recent numbers of *Die Chemische Industrie* have contained accounts of articles, by Major L. B. Holliday ("The Dyestuffs Situation: From the Maker's Point of View) and Mr. H. Sutcliff Smith ("The Dyestuffs Situation: Aspects of the Users' Case") respectively, published a short time ago in The Chemical Age.

I.G. Farbenindustrie A.-G. in Frankfurt

According to the *Zeitschrift der Deutschen Oel-und Fett-Industrie*, it is rumoured that the dividend of the above company for the financial year 1925 will not be less than that of the previous year (8 per cent.), while a slight increase is possible. The company is at present engaged in erecting, near Cologne, a factory for the production of artificial silk by a method patented by the J. P. Bemberg A.-G.

Company News

LOA NITRATE CO.—A final dividend of 5 per cent., making 12½ per cent. for the year 1925 is announced.

CASTNER-KELLNER ALKALI CO.—An interim dividend of 8 per cent. has been declared payable, less tax, on May 20.

PAN DE AZUCAR NITRATE CO.—An interim dividend of 5 per cent., less income tax, has been declared on account of the profits for the year ending June 30, 1926.

JURGENS, LTD.—In the recent suit Van Houten against Jurgens, judgment was in favour of the first-named, so that the latter company will have to pay the dividend for the preceding years on the common shares, totalling 15 per cent. The directors are to submit schemes giving effect to this.

ANGLO-EGYPTIAN OILFIELDS, LTD.—The directors have resolved to recommend to the annual general meeting of shareholders, to be held on May 20, that a dividend of 12½ per cent., less income tax, be paid on the "B" shares for the year 1925.

BENZOL AND BY-PRODUCTS CO., LTD.—The accounts for the year ended September 30 show a loss of £9,470. The sum of £2,078 has been transferred from the reserve, and a half year's dividend has been paid on the preference shares, leaving £12,111 to be carried forward.

LAGUNAS NITRATE CO., LTD.—An extraordinary general meeting has been convened for April 29, at noon, at Baltic House, 27, Leadenhall Street, London, for the purpose of approving a resolution for the immediate distribution of 13s. per share, free of tax, to the shareholders.

TEAM BY-PRODUCT COKE CO.—The report for the year ended November 30 last, states that operations show a loss of £24,806. To this must be added the balance brought forward of £30,814, leaving a debit balance to be carried forward of £55,620. The annual meeting will be held in Newcastle on April 28, at 12 noon.

EASTMAN KODAK COMPANY OF NEW JERSEY.—The net profits for 1925 were $18,467,114. Dividends totalling $8 on the common stock have been paid, and there has been placed to reserve for dividends on common stock in litigation $113,800, leaving, after payment of the preferred dividends, $1,751,732 to be added to the surplus, making it $68,274,845.

LOW TEMPERATURE CARBONISATION, LTD.—Meetings of the shareholders and creditors of Low Temperature Carbonisation ("Coalite") and Gas and Fuel Plants (Ltd.) have been called for May 3 and 4, for the purpose of sanctioning a scheme of arrangement for the reorganisation and amalgamation of the above companies and the Barnsley Smokeless Fuel Company.

NITRATE RAILWAYS CO.—The directors recommend a final dividend of 6 per cent. (12s. per share) on the ordinary, unconverted shares, making a total dividend for the year 1925 of 10 per cent., less tax. Also a final dividend of 3 per cent., 6s. per share, on the preferred converted ordinary shares, making a total and maximum dividend for the year 1925 of 7 per cent., and a dividend of 6s. per share on the deferred converted ordinary shares, being 3 per cent. for the year 1925, both less tax.

LIBIOLA COPPER CO.—The report for the year ended December 31 last states that the profit and loss account shows a net profit of £6,555, to which has to be added the balance brought forward of £1,578, making a total to be dealt with of £8,133. The directors recommend that a dividend of 2s. per share, less tax at 4s. 1½d., be paid on May 3, and that £1,814 be placed to reserve account, leaving a balance of £1,279 to be carried forward.

BRITISH COTTON-SEED PRODUCTS, LTD.—At the extraordinary meeting held at Winchester House, London, on Tuesday, resolutions were submitted to the effect that the meeting was dissatisfied with the conduct of the directors, and called upon them to retire. On a show of hands this resolution and a second one to remove the directors were lost by a large majority. A poll was taken, the result of which was 86,967 shares for the resolutions and 75,190 shares against them. The first resolution, being an ordinary resolution, was therefore carried by the poll, and the second one, being an extraordinary resolution, and requiring a three-fourths majority, was lost on the poll.

CANADIAN CELANESE, LTD.—A statement respecting the company, for general information only, was published in the Press on Wednesday. The company was formed in January this year to acquire the sole rights for the Dominion of Canada and its dependencies, to manufacture cellulose acetate, etc., under the Dreyfus patents and processes, including the manufacture of artificial silk, non-inflammable celluloid, photographic and cinematograph films, artificial wool, etc. The authorised share capital is $15,000,000 7 per cent. cumulative participating preferred stock (in shares of $100 each), of which $7,200,000 have been issued, and 300,000 shares non-par value common stock, of which 233,800 have been issued. Sir William Alexander, K.B.E., is one of the directors of the company.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

COPRA, ETC.—Agents in Oslo desire British representation for copra, soya beans, and other oil seeds. (Reference No. 503.)

GLYCERINE, ETC.—Agents in Norway desire to represent British manufacturers of glycerine for soap factories and oils for margarine. (Reference No. 501.)

WHITE LEAD OIL PASTE.—The South African Railways and Harbours Administration is calling for tenders to be presented by May 27 for the supply and delivery of genuine white lead oil paste. (Tender No. 816.) For further particulars apply Reference B.X. 2,485.

CHEMICALS FOR PAPER MAKING.—A firm of import and export merchants established in Malmo desires to obtain sole agencies for Sweden of British manufacturers of bleaching powder, salt cake, sal ammoniac, chloride of barium, caustic bottoms, ammonium alkali, China Clays, sizing, starch, rosin, paraffin wax, etc. (Reference No. 518.)

CHEMICALS.—Importers in Stockholm desire to represent British manufacturers of sulphate of soda and sulphate of alumina for paper making. (Reference No. 510.)

CHEMICALS.—Agents in Gothenburg desire British representation for chemicals used in paper and pulp, and soap industries, also drugs. (Reference No. 511.)

CHEMICALS.—A Copenhagen house wishes to be put in touch with British firms desiring Danish representation for: Zinc (white), red and white lead, China wood oil, shellac, caustic soda, and potash. Write, quoting the CHEMICAL AGE, to Det Hempelske Handelshus, Copenhagen, Amaliegade 11.

FIRE EXTINCTEURS, ETC.—The Commissioners of H.M. Works, etc., invite tenders for supply of carbon tetrachloride fire extincteurs and brackets. Forms on application to the Controller of Supplies, H.M. Office of Works, etc., King Charles Street, Westminster, London, S.W.1. Tenders before 11 a.m. on May 4.

SULPHURIC ACID, ETC.—Rothesay Gas Committee invite tenders for the supply of about 80 tons of sulphuric acid, 144° Tw., to be delivered as required; and for the supply of about 2,000 40-gallon secondhand hardwood petroleum barrels, with turned hardwood bungs for tar, for year from May 15, 1926; and for about 2,000 barrels of refined tar in 40-gallon hardwood barrels, delivered to the purchasers. Tenders to Town Clerk by May 1.

Tariff Change

GOLD COAST.—An Order removes the prohibition of the importation into the Gold Coast of all derivatives of coal tar, generally known as intermediates for dyestuffs which are the produce or manufacture of any part of the German dominions, and all direct cotton colours, all union colours, all acid colours, all chrome and mordant colours; all alizarine colours, all basic colours, all sulphide colours, all vat colours (including synthetic indigo), all oil, spirit and wax colours, all lake colours, and any other synthetic colours, dyes, stains, colour acids, colour lakes, leuco acids, leuco bases, whether in paste, powder, solution, or any other form, which are the produce or manufacture of any part of the German dominions.

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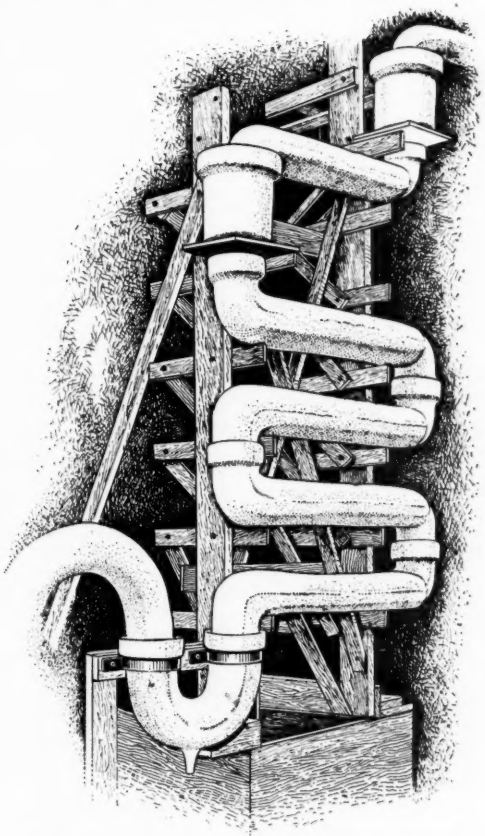

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ABC Code, 5th and 6th Editions, and Bentley's used.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BANNER (SAMUEL) AND CO., LTD., Liverpool, chemical manufacturers. (M., 24/4/26.) Registered April 9, mortgage to Bank; charged on 53, 55 and 59, Sandhills Lane, Kirkdale, Liverpool, with machinery, etc. *Nil. April 8, 1925.

REXEAN CO., LTD., Southport, perfume manufacturers. (M., 24/4/26.) Registered March 27, £800 debenture created by receiver; general charge.. *Nil. January 22, 1925.

THORNTON AND ROSS, LTD., Milnsbridge, manufacturing chemists. (M., 24/4/26.) Registered April 3, £744 charge, to Building Society; charged on property at Milnsbridge. *Nil. December 25, 1925.

Receivership

PHILLI-MIRANO, LTD. (R., 24/4/26.) S. Sharpe, of Balfour House, Finsbury Pavement, E.C., was appointed Receiver and Manager on April 7, under powers contained in debenture dated February 3, 1926.

London Gazette, &c.

Company Winding Up Voluntarily

HUDSON (H. W.), LTD. (C.W.U.V., 24/4/26.) R. F. Frazer, 41, North John Street, Liverpool, Chartered Accountant, appointed liquidator, April 9. Meeting of creditors at the offices of the liquidator at 11 a.m. April 30. Creditors' claims by June 14th.

Partnership Dissolved

ARMSTRONG PRODUCTS CO. (Harold John BURRELL and Harold JENKS), manufacturers of chemical and engineering products, Birmingham, by mutual consent as from March 31, 1926, so far as concerns H. J. Burrell, who retires from the firm.

New Companies Registered

BARRACKS FABRICS PRINTING CO., LTD., The Barracks Print Works, Crompton Road, Macclesfield. Registered April 13, 1926. Silk dyers and printers, etc. Nominal capital, £5,000 in £1 shares.

FERTILISING PRODUCTS, LTD., 4, Great St. Thomas Apostle, London, E.C. Registered April 17, 1926. Manufacturers, exporters, importers and sellers of fertilisers, chemicals and pharmaceutical products, etc. Nominal capital, £1,000 in £1 shares (750 7 per cent. cumulative preference and 250 ordinary).

W. AND J. GLOSSOP, LTD. Registered April 14, 1926. Tar distillers, tar spraying and grouting contractors, stone quarry owners, etc. Nominal capital, £60,000 in £1 shares. A director: W. Glossop, Highfield, Hipperholme, near Halifax.

JOSEPH HARDCASTLE, LTD., Providence Dyeworks, Whitehall Road, Wortley, Leeds. Registered April 17, 1926. Dyers, finishers, buyers and sellers of dyewares and chemicals, soap manufacturers, etc. Nominal capital, £8,000 in £1 shares.

NORFOLK CHEMICALS, LTD. Registered April 16, 1926. Refiners, soap makers, manufacturing chemists and manufacturers of and dealers in oils, soaps, chemicals, etc. Nominal capital, £1,100 in 190 ordinary shares of £5 each and 150 ordinary shares of £1 each. Solicitors: Barfield and Barfield, 1, West Street, Finsbury Circus, London, E.C.

Latest Government Contracts

RECENT Government contracts placed by the various departments include :—

Admiralty

CIVIL ENGINEER-IN-CHIEF'S DEPARTMENT.—Portland Cement: T. Beynon and Co., Ltd., Cardiff; Ship Canal P.C. Manufacturers, Ltd., Ellesmere Port, Cheshire; Cement Marketing Co., Ltd., London, S.W.

CONTRACT AND PURCHASE DEPARTMENT.—Colours, Dry and Mixed Paints: R. Gay and Co., Ltd., London, S.W.; Craig and Rose, Ltd., London, S.E.; Golden Valley and Ochre and Oxide Co., Ltd., Wick, near Bristol; W. R. Todd and Son, Ltd., Hull. Condensers (W/T): Dubilier Condenser Co., Ltd., London, W.; Sparklets, Ltd., London, N. Enamel, Antisulphuric: R. I. Clark and Co., Ltd., West Ham. Grease, Mineral: Anglo-American Oil Co., Ltd., London, S.W. Machines, Refrigerating and Magazine Cooling: Pulsometer Engineering Co., Ltd., Reading. Micrometer, Calipers, Surface Gauges, etc.: L. S. Starrett Co. (Great Britain), Ltd., London, E.C.; J. Shaw and Sons, (Wolverhampton), Ltd., Wolverhampton. Oil, Light Shale: Scottish Oil Agency, Ltd., Glasgow.—Oil, Lighting Mineral: Scottish Oil Agency, Ltd., Glasgow. Oil, Sperm, Mineral: Anglo-American Oil Co., Ltd., London, S.W. Oils, Lubricating: Anglo-American Oil Co., Ltd., London, S.W.; Silvertown Lubricants, Ltd., London, E. Oxide of Iron Paint: Colthurst and Harding, Bristol. Petroleum Spirit: Anglo-American Oil Co., Ltd., London, S.W.; Scottish Oil Agency, Ltd., Glasgow. Plant, Evaporating and Distilling: G. and J. Weir, Ltd., Glasgow. Pump, Centrifugal: Ledward and Beckett, Ltd., London, S.W. Rosbonite: Pinchin, Johnson and Co., Ltd., London, W.C. Rotary Circulating Water Screen: Ledward and Beckett, Ltd., London, S.W. Soap, Soft: Peter Lunt and Co., Ltd., Liverpool.

War Office

Extincteurs—Exchange of old for new stock as required: Pyrene Co., Ltd., London, S.W.

Air Ministry

Butyl Acetate: W. J. Bush and Co., Ltd., London, E. Fluid, Disinfectant: Jeyes Sanitary Compounds, Ltd., London, E.C. Oil, Mineral, Vapourising: British Petroleum Co., Ltd., London, E.C. Paraffin, England and Ireland: Anglo-American Oil Co., Ltd., London, E.C.; Scotland: Scottish Oil Agency, Ltd., Glasgow. Photographic Stores: Siebe Gorman and Co., Ltd., London, S.E. Soft Soap: Peter Lunt and Co., Ltd., Aintree, Liverpool.

Post Office

Acid, Sulphuric: Spencer, Chapman and Messel, Ltd. London, E. Fire Extincteurs, etc.: Mather and Platt, Ltd., London, S.W. Kerosene: The Anglo-American Oil Co., Ltd., London, E.C.; The Scottish Oil Agency, Ltd., Glasgow.

Crown Agents for the Colonies

Candles: Prices Patent Candle Co., London, E.C. Cement: Cement Marketing Co., London, S.W.; T. Beynon and Co., Ltd., London, E.C. Gelignite: Nobel Industries, Ltd., London, S.W. Paint: Indestructible Paint Co., London, E.C.; Torbay Paint Co., London, E.C.; Wilkinson and Heywood and Clark, London, W.C. Plant, Limehardening and Purification: The Paterson Engineering Co., London, W.C. Quinine: Howards and Sons, Ltd., Ilford.

Woollen and Worsted Research

THE programme of physical and chemical research for the current year of the British Research Association for the Woollen and Worsted Industries includes the following:

Department of chemistry.—The constitution of wool; the sulphur in wool; sorption; sorption of acids by wool; acidity, neutrality, and alkalinity, and their various effects on wool and textiles; fastness of dyestuffs; scouring; chlorination; oils; sheep-marking fluids; quality and spinning quality.

Department of physics.—The relation of elasticity to regain; swelling of wool fibre, its specific heat and specific volume; normal variability of commercial yarns; relation of variability and resultant defects in cloth; relation of strength and elasticity to regain.